

NTIS/PS-79/0827

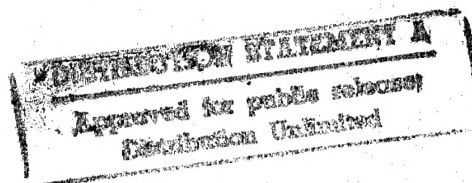
# **Solid Waste Reclamation and Recycling Part 2. Plastics**

**A Bibliography with Abstracts**

Search period covered

1964 - July 1979

19951218 031



**DEPARTMENT OF DEFENSE**  
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-- 1 - AD NUMBER: D428876  
-- 5 - CORPORATE AUTHOR: NATIONAL TECHNICAL INFORMATION SERVICE  
-- SPRINGFIELD VA\*  
-- 6 - UNCLASSIFIED TITLE: SOLID WASTE RECLAMATION AND RECYCLING. PART  
-- 2. PLASTICS (A BIBLIOGRAPHY WITH ABSTRACTS).  
-- 9 - DESCRIPTIVE NOTE: 1964 - JUL 79,  
--10 - PERSONAL AUTHORS: HUNDEMANN, A. S. ;  
--11 - REPORT DATE: AUG , 1979  
--12 - PAGINATION: 131P  
--20 - REPORT CLASSIFICATION: UNCLASSIFIED  
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-- NTIS/PS-76/0515, NTIS/PS-75/451, AND COM-73-11453.  
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--33 - LIMITATION CODES: 1

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## BIBLIOGRAPHIC INFORMATION

NTIS/PS-79/0827

Solid Waste Reclamation and Recycling. Part 2. Plastics (A Bibliography with Abstracts).

Aug 79,  
Audrey S. Hundemann.

National Technical Information Service, Springfield, VA.

Report period covered: Rept. for 1964-Jul 79,

Supersedes NTIS/PS-78/0762, NTIS/PS-77/0667,  
NTIS/PS-76/0515, NTIS/PS-75/451, and COM-73-11459.

The recovery of waste plastics including that from packaging, tires, and urban refuse is covered. The sorting, decomposition to reusable chemicals, and reuse in new products are discussed along with the economics, legislation, policies, and planning aspects of plastics recycling. (This updated bibliography contains 125 abstracts, 10 of which are new entries to the previous edition.)

PRICE CODE: PC N01/MF N01

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201 to 300 technical report summaries	150	190
301 to 400 technical report summaries	175	220
401 to 500 technical report summaries	200	250
More than 500 technical report summaries		Negotiated

# Process for Recovering Filler from Polymer

Department of Energy, Washington, DC.

## Patent

AUTHOR: Smith, M. L.; Smith, P. M.

F0891A1 Fld: 7C, 90B, 99C GRAI7911

Filed 12 Aug 77, patented 23 May 78 10p

Rept No: PAT-APPL-824 191

Monitor: 18

Supersedes PAT-APPL-824 191-77.

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 \$0.50.

**Abstract:** This disclosure relates to a process for recovering filler material from a polymeric matrix by reacting the matrix at an elevated temperature in a gas atmosphere with a controlled oxidizing potential and thereafter separating and cleaning the residue from the reaction mixture. (ERA citation 04:014069)

**Descriptors:** \*Fillers, \*Polymers, Chemical reactions, High temperature, Recovery, Separation processes

**Identifiers:** ERDA/360301, \*Patents, NTISGPDE, NTISDE

PATENT-4 091 077 NTIS Prices: Not available NTIS

# Solvolytic Degradation of Pyrotechnic Materials Containing Crosslinked Polymers

Department of the Navy Washington DC (110050)

## Patent

AUTHOR: Tompa, Albert S.; French, David M.; Butler, George B.; Kaufman, Melvin S.

F0222H4 Fld: 7E, 19A, 79A, 99C, 90B GRAI7904

Filed 15 Dec 76, patented 4 Jul 78 7p

Rept No: PAT-APPL-750 990; PATENT-4 098 627

Monitor: 18

Supersedes PAT-APPL-750 990-76.

Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 \$0.50.

Abstract: Pyrotechnic materials containing a crosslinked polymer as a component thereof are decomposed by heating to a temperature of about 50 degrees to about 160 degrees C in a liquid medium comprising an active hydrogen containing compound capable of cleaving the chemical bonds contained in said polymer. One or more components of the pyrotechnic material may be separated from the products of the decomposition and reclaimed. (Author)

Descriptors: \*Patents, \*Pyrotechnics, Reclamation, Explosive ordnance disposal, Degradation, Crosslinking (Chemistry)

Identifiers: PAT-CL-149-109-6, Solvent action, Chemical decomposition, \*Polymers, NTISGPN

AD-D005 356/1ST NTIS Prices: Not available NTIS

Conversion of Cellulosic and Waste Polymer Material to Gasoline.  
Progress Report

Arizona State Univ., Tempe. Coll. of Engineering and Applied  
Sciences.\*Department of Energy. (9501383)

AUTHOR: Kuester, J. L.

E2262L4 Fld: 21D, 97K, 68C GRAI7821

Nov 77 5p

Contract: EY-76-S-02-2982

Monitor: 18

Abstract: Progress is reported in research on the improvement of the composition of pyrolysis gas produced by the Fischer-Tropsch catalytic reactor. Results of studies of the effects of pressure on product yields are reported. (ERA citation 03:039402)

Descriptors: \*Cellulose, \*Gasoline, Fischer-tropsch synthesis, Organic polymers, Organic wastes, Pyrolysis

Identifiers: ERDA/090122, \*Refuse derived fuels, Solid wastes, NTISDE

COO-2982-21 NTIS Prices: PC A02/MF A01

## Plastics: The Role of Conservation and Recycling

AECI Ltd., Johannesburg (South Africa). Plastics Technical Service Lab.

AUTHOR: Tanner, D. J.

E212113 Fld: 111, 710, 68C STAR1616

1976 18p

Monitor: 18

Conf-Presented at the 1ST S. African Conf. On Plastics in the Serv. Of Man.

**Abstract:** The technical and economic scenario of plastics Conservation and recycling is described. The consumption of plastics is first discussed and packaging is shown to be the largest market sector and also the major constituent of plastic waste. Various policies for plastics waste are briefly discussed as alternatives to conservation and recycling. It is suggested that conservation can operate in two ways: either goods of higher quality and long lifetimes are produced, or the consumption of unnecessary goods is reduced. Recycling possibilities for plastics are discussed in terms of the processes which could be required in a plastics recycling industry. The differing interest of industry and the community in matters of the environment are discussed. The aims, recycling, and conservation are discussed in terms of costs and benefits to industry and the community.

**Descriptors:** \*Conservation, \*Consumption, \*Plastics, Recycling, Economics, Materials recovery, Solid wastes, Waste utilization

**Identifiers:** South Africa, \*Waste recycling, NTISNASAE

N78-25213/7ST NTIS Prices: PC A02/MF A01

The Application of Technology-Directed Methods to Reduce Solid Waste and Conserve Resources in the Packaging of Non-Fluid Foods. Volume I. Summary

Franklin Associates, Ltd., Prairie Village, Kans.\*National Science Foundation, Washington, D.C. Applied Science Research Applications.

Final rept.

AUTHOR: Hunt, Robert G.; Shobe, Franklin D.; Trewolla, John C.;

Franklin, William E.

E1991D3 Fld: 6H, 13D, 68C, 98H, 94G GRAI7819

Feb 78 70p

Contract: NSF-C-76-20055

Monitor: NSF/RA-780005

See also Volume 2, PB-282 900.

Also available in set of 3 reports PC E09, PB-282 898-SET.

Abstract: Packaging materials are discarded after use to solid waste streams or recovered for reuse, recycling, or energy recovery. Materials which are disposed of by landfill or incineration represent a significant loss of the nation's finite resources and contribute substantially to solid waste problems. In this study, the impact of technological innovation in non-fluid food packaging is analyzed. Historical trends and case studies indicate that technological innovation has resulted in substantial reduction of packaging per unit of food. The savings have ranged from one to 90 percent for specific cases. However, growth in foods that require more packaging per unit has resulted in net gain or loss of packaging per unit over the 16-year period--1960 to 1975. Governmental regulatory activity aimed at packaging in general will impact on non-fluid food packaging as a part of the whole packaging sector. Volume 1 presents the analysis and summary results of the study.

Descriptors: \*Food packaging, \*Solid waste disposal, Management planning, Refuse disposal, Data processing, Trends, Recycling, Containers, Paper, Plastics, Government policies, Economic analysis, Conservation, Metals

Identifiers: Waste recycling, NTISNSFRA

PB-282 899/4ST NTIS Prices: PC A04/MF A01



The Application of Technology-Directed Methods to Reduce Solid Waste and Conserve Resources in the Packaging of Non-Fluid Foods. Volume II. Data and Calculations

Franklin Associates, Ltd., Prairie Village, Kans.\*National Science Foundation, Washington, D.C. Applied Science Research Applications.

Final rept.

AUTHOR: Hunt, Robert G.; Shobe, Franklin D.; Trewolla, John C.; Franklin, William E.

E1991D4 Fld: 6H, 13D, 68C, 98H, 94G GRAI7819

Feb 78 269p

Contract: NSF-C-76-20055

Monitor: NSF/RA-780006

See also Volume 1, PB-282 899, and PB-282 901.

Also available in set of 3 reports PC E09, PB-282 898-SET.

Abstract: This volume consists of four Appendices which include the data and calculations concerning non-fluid foods and their packaging from 1960-1975 as follows: Appendix A--Consumption of packaging for non-fluid foods; Appendix B--Consumption of non-fluid foods; Appendix C--Compaction factors of non-durable and durable goods; Appendix D--Recovery of corrugated containers for recycling from supermarkets.

Descriptors: \*Food packaging, \*Solid waste disposal, Management planning, Refuse disposal, Data processing, Containers, Statistics, Tables(Data), Paper, Boxboard, Plastics, Aluminum, Composite materials, Statistics, Consumption, Economic analysis, Recycling

Identifiers: Waste recycling, NTISNSFPA

PB-282 900/OST NTIS Prices: PC A12/MF A01

The Application of Technology-Directed Methods to Reduce Solid Waste and Conserve Resources in the Packaging of Non-Fluid Foods. User Handbook for Government Officials

Franklin Associates, Ltd., Prairie Village, Kans.\*National Science Foundation, Washington, D.C. Applied Science Research Applications.

Final rept.

AUTHOR: Hunt, Robert G.; Shobe, Franklin D.; Trewolla, John C.; Franklin, William E.

E1991E1 Fld: 6H, 13D, 68C, 98H, 94G GRAI7819

Feb 78 17p

Contract: NSF-C-76-20055

Monitor: NSF/RA-780007

See also Volume 2, PB-282 900.

Also available in set of 3 reports PC E09, PB-282 898-SET.

Abstract: Possible government actions to alter the present market system by encouraging resource conservation and waste reduction are the subject of this Handbook. The probable effects of such actions are compared to the probable effects of allowing present market systems to function without additional packaging regulations.

Descriptors: \*Food packaging, \*Solid waste disposal, \*Management planning, Refuse disposal, Government policies, Recommendations, Containers, Metals, Boxboard, Plastics, Composite materials, Conservation, Recycling

Identifiers: Waste recycling, NTISNSFRA

PB-282 901/8ST NTIS Prices: PC A02/MF A01

## Separation of Plastics by Flotation

Department of the Interior, Washington, D.C. (109 950)

### Patent Application

AUTHOR: Valdez, Espiridion G.; Wilson, Wayne J.

E1725B4 Fld: 11I, 90B, 68C, 710, 91A GRAI7817

Filed 17 Jan 78 8p

Rept No: EAT-APPL-870 161; DOCKET/MIN-2613

Monitor: 18

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Abstract: Individual components of mixtures of scrap plastic materials are separated by flotation employing sodium silicate as a wetting agent and fatty amines as promoters.

Descriptors: \*Plastics, \*Materials recovery, \*Solid waste disposal, \*Flotation, \*Patent applications, Refuse disposal, Sodium silicates, Amines, Polystyrene, Polyamides

Identifiers: Waste recycling, NTISGPINT

PB-280 285/8ST NTIS Prices: PC A02/MF A01

A Study of the Feasibility of Utilizing Solid Wastes for Building Materials. Phase II. Summary Report

Material Systems Corp., Escondido, Calif.\*Municipal Environmental Research Lab., Cincinnati, Ohio. Solid and Hazardous Waste Research Div.

AUTHOR: Duft, B. I.; Levine, H.; McLeod, A.; Tsur, Y.

E1614D1 Fld: 13B, 13C, 11D, 68C\*, 50C\*, 89G, 71F\* GRAI7816

Apr 78 280p\*

Contract: EPA-68-03-2056

Monitor: EPA/600/2-78/092

See also report dated Jun 77, PB-271 007 and Phase 1 report, PB-279 440.

Abstract: This document reports on a study to research and develop building materials containing organic and inorganic wastes and waste-derived products. Structural and aesthetic properties of variously formulated composites are evaluated. Limited economic analyses indicate that several commercially viable products could be derived from wastes.

Descriptors: \*Construction materials, \*Solid waste disposal, \*Industrial wastes, \*Reclamation, Agricultural wastes, Management planning, Composite materials, Reinforced plastics, Reinforcing materials, Fibers, Fillers, Fly ash, Glass, Plastics, Wood wastes, Fabrication, Laboratory tests, Performance evaluation, Buildings, Cost estimates

Identifiers: Waste recycling, Rice hulls, Plastic recycling, Glass recycling, NTISEPAORD

PB-279 441/0ST NTIS Prices: PC A13/MF A01

A Study of the Feasibility of Utilizing Solid Wastes for Building Materials. Phase I Summary Report

Material Systems Corp., Escondido, Calif.\*Municipal Environmental Research Lab., Cincinnati, Ohio. Solid and Hazardous Waste Research Div.

AUTHOR: Duft, B. I.; Levine, H.; McLeod, A.

E1462F3 Fld: 13B, 13C, 11D, 68C\*, 50C\*, 89G\*, 71F\* GRAI7815

Apr 78 164p\*

Contract: EPA-68-C3-2056

Monitor: EPA/600/2-78/091

See also report dated Jun 77, PB-271 007 and Phase 2 rept., PB-279 441.

**Abstract:** This document reports on a study to research and develop building materials containing organic and inorganic wastes and waste-derived products. A comprehensive literature search was conducted to review and evaluate wastes with potential as matrices, reinforcements, or fillers in building composites. The most promising candidates were evaluated with limited laboratory studies. From these studies, two types of matrices, furfural-phenolic and inorganic, were selected for further study. Seven reinforcement candidates and five filler candidates were selected for evaluation with the two matrices.

**Descriptors:** \*Construction materials, \*Solid waste disposal, \*Industrial wastes, \*Reclamation, Reinforced plastics, Management planning, Composite materials, Reinforcing materials, Fillers, Fly ash, Glass, Agricultural wastes, Cellulose, Fibers, Phenolic resins, Bagasse, Cements, Starches, Lignin, Wood wastes, Sludge disposal, Laboratory tests, Performance evaluation, Furfurals

**Identifiers:** Manure, Rice hulls, Plastic recycling, Glass recycling, Sewage sludge, Waste recycling, NTISEPAORD

PB-279 440/2ST NTIS Prices: PC A08/MF A01

## The Potential for Reusable, Homogeneous Containers

Stanford Research Inst., Menlo Park, Calif.\*National Science Foundation, Washington, D.C. Applied Science Research Applications. (332 500)

Final rept.

AUTHOR: Goen, Richard L.; Steele, Robert V.; Somogyi, Laszlo P.; Parks, Thomas R.; Fishman, Norman  
E1023K3 Fld: 13E, 13K, 6H, 68C\*, 98H\*, 91A\* GRAI7811

Jul 77 83p\*

Rept No: SPI-CRESS-25

Grant: NSF-AER76-02396

Project: SRI-EGU-5674

Monitor: NSF/RA-770396

See also report dated Feb 77, PE-265 100.

**Abstract:** The widespread use of disposable packaging in the United States not only expends considerable energy and materials but also contributes to a rapidly growing solid waste problem. The introduction of reusable, homogeneous containers into the packaging market could contribute significantly to the alleviation of these problems. This study examines the feasibility of reusable containers for food products (excluding beverages). Concepts are formulated for reusable containers, including consideration of configuration and type of material. The energy used and material for the reusable container systems are compared with those of the present container systems. The costs of returning the empty containers are estimated. Potential technical problems are identified. The concept of reusable food containers appears promising, but technical problems remain to be resolved, and implementation strategies must be developed.

**Descriptors:** \*Solid waste disposal, \*Containers, \*Food packaging, \*Management planning, Glass, Paper, Plastics, Boxes (Containers), Cans, Metals, Recycling, Energy consumption, Government policies, Legislation, Economic analysis, Cost estimates

**Identifiers:** Beverage containers, Waste recycling, Mandatory deposits, Solid waste abatement, Reusable materials, NTISNSPRA, NTISSRI

PB-277 444/6ST NTIS Prices: PC A05/MF A01

# Energy Analysis of Resource Recovery Options. Final Report

Ontario Research Foundation, Sheridan Park. (4941000)  
AUTHOR: Brown, C. K.; Epton, F. J.; Laughlin, R. G. W.; Sax, S. E.  
EO543E1 Fld: 13E, 68C, 97B, 91A GFAI7806  
30 Apr 76 153p  
Monitor: 18  
U.S. Sales Only.

Abstract: The primary objective of this study is to assess the energy cost of several resource recovery options for municipal refuse, with some specifics of systems in Ontario. In Section 2, the procedures and methodology for energy analysis are discussed. Details on the derivation of energy analyses carried out on newspaper, glass bottles, steel cans, aluminum, and IOFAC plastic bottles are given in Sections 3 to 7. Sections 8 and 9 cover some background information on energy usage by fuel type in primary Ontario Industries and on calorific values of materials commonly found in the waste stream. Section 10 makes recommendations for future studies in the net energy analysis of resource recovery options. An extensive bibliography is provided. (EPA citation C3:001040)

Descriptors: \*Materials recovery, \*Ontario, Aluminium, Glass, Municipal wastes, Plastics, Recycling, Resource conservation, Resources, Steels, Waste management, Calorific value, Economics, Energy analysis, Energy conservation, Energy consumption, Metals, Minerals, Net energy, Paper, Recovery, Refuse derived fuels, Waste heat

Identifiers: EPDA/299003, EFDA/090222, ERDA/320604, ERDA/290400, ERDA/290100, Canada, \*Solid waste disposal, \*Refuse disposal, \*Waste recycling, Electric power consumption, Fuel consumption, NTISERLAP

NP-22443 NTIS Prices: PC A08/MF A01

Solid Waste Management in Illinois. Volume 3. Resource Recovery

Weston (Roy F.), Inc., Wilmette, Ill.\*Illinois Inst. for Environmental Quality, Chicago.

Final rept.

EO423F4 Fld: 13B, 68C, 91A GRAI7805

1974 62p

Project: IIEQ-40.001

Monitor: IIEQ-74-53

See also Volume 1, PB-275 079 and Volume 4, PB-275 081.

Abstract: Contents: Resources and urban wastes; Markets for resources; Unit processes and operations for resource recovery; Practical resource recovery systems; Utilization of source-segregated urban wastes; Existing legislation; Summary and recommendations.

Descriptors: \*Solid waste disposal, \*Materials recovery, \*Management planning, \*Illinois, Metal scrap, Paper, Plastics, Elastomers, Wood wastes, Tires, Fertilizers, Fuels, Forecasting, Composting, Biodegradation, Incineration, Pyrolysis, Cost analysis, Fly ash, Sludge disposal, Regulations, Legislation, Government policies, State government, Local government

Identifiers: Waste recycling, Junk car disposal, Sewage sludge disposal, NTISEPA2, NTISIIEQ

PB-275 080/OST NTIS Prices: PC A04/MF A01



# Automobile Scrappage and Recycling Industry Study - Overview Report

H. H. Aerospace Design Co., Inc., Bedford, Mass.\*Transportation Systems Center, Cambridge, Mass.

Final rept. Jun-Dec 75

AUTHOR: Kaiser, F.; Wasson, R. F.; Daniels, A. C. W.

EO164C1 Fld: 13B, 5C, 68C\*, 96A\*, 91A\* GRAI7802

Sep 77 409p\*

Contract: DOT-TSC-1028

Monitor: DOT-TSC-CST-77-11

**Abstract:** The principal factors which influence the recovery of materials from junked automobiles are reviewed and evaluated. These include the number and materials composition of the automobiles that are retired annually in the U.S.; the flow of junk automobiles into the commercial recovery cycle and problems associated with abandoned automobiles; operations of the auto wrecking industry where serviceable parts are salvaged; and the structure, operations and technology of the scrap industry which transforms automobile hulks into commercial grades of metal scrap. Since Federal laws and policies impact on the reclamation of materials from junked automobiles, a legal review of key legislation and policies is also included. Because of a strong demand for auto hulks by scrap processors, created by an increased market for ferrous scrap, the problem of an ever increasing accumulation of unprocessed deregistered automobiles has been stabilized. In 1974, the fractional recovery of metallic materials from the approximately ten million automobiles deregistered that year was higher than from other forms of obsolete scrap. The estimated value of the recovered materials was in excess of one billion dollars.

**Descriptors:** \*Automobiles, \*solid waste disposal, \*Materials recovery, \*Economic analysis, Motor vehicles, Metal scrap, Plastics, Iron alloys, Government policies, Regulations, Waste processing, Legislation, Trends, Steels, Rubber industry, Tires

**Identifiers:** \*Waste recycling, \*Junk car disposal, Metal recycling, Scrap recycling, Plastics recycling, Secondary materials industry, Tire recycling, NTISDOTOS, NTISDOTTSC

PB-273 286/5ST NTIS Prices: PC A18/MF A01

The Chemical and Physical Properties of Asphalt Rubber Mixtures. Part I. Basic Material Behavior

Arizona Dept. of Transportation, Phoenix. Materials Services.\*Federal Highway Administration, Phoenix, Ariz. Arizona Div.

Final rept. Mar 75-Jul 77

AUTHOR: Green, E. L.; Tolonen, William J.

D3801F4 Fld: 13C, 13E, 68C, 91A, 50A, 50C GRAI7726

Mar 77 97p

Rept No: ADCT-RS-14(162)-1

Monitor: FHWA-AZ-HPR-14-162

Abstract: The properties of asphalt-rubber mixtures composed of paving grade asphalt and ground automobile tire rubber are examined. The mechanism of swelling of the rubber in asphalt and asphalt-like materials is proposed and the effect of variables which affect the swelling is discussed. Experiments determining the swelling of tire rubber in selected oils are related to the swelling of tire rubber in asphalt. Several test methods are presented which measure the properties of the asphalt-rubber mixture. Data concerning the properties of a commercially available asphalt-rubber mixture and the effects of processing variables on these properties are presented. Techniques useful for the quality control of this material as well as suggestions for research into the theoretical aspects of the unique characteristics of this material are discussed.

Descriptors: \*Solid waste disposal, \*Tires, \*Reclamation, \*Flexible pavements, Additives, Elastomers, Rubber coatings, Membranes, Field tests, Construction materials, Viscosity, Swelling, Dynamic properties, Strains, Binders(Materials), Laboratory tests, Rheology, Kerosene, Elastic properties, Highways

Identifiers: Tire recycling, NTISDOTFHA

PE-272 685/9ST NTIS Prices: PC A05/MF A01

# Photodegradable Plastics Containing Halogenated Diphenyl Ethanes

Department of Agriculture, Washington, D.C. (108 800)

## Patent

AUTHOR: Freedman, Bernard; Diamond, Martin J.  
E3725E2 Fld: 11I, 7C, 7E, 90E, 710, 99C, 99E GPA17725  
Filed 26 Nov 74, patented 8 Mar 77 5p  
Rept No: PAT-APPL-527 400, PATENT-4 011 375  
Moni+cr: 18

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, D.C. 20231 \$0.50.

Abstract: Polyclefins capable of photodegradation are prepared by incorporating in the polyclefin an additive which contains chlorine, bromine, or iodine in alpha position in an arylmethyl structure.

Descriptors: \*Patents, \*Photodegradation, \*Plastics, \*Synthesis (Chemistry), \*Olefin resins, Halogen organic compounds, Additives, Solid waste disposal, Plants (Botany), Containers, Films, Food industry, Photochemistry

Identifiers: PAT-CI-526-1, NTISGEAG

PB-272 610/7ST NTIS Prices: Not available NTIS

## Analysis of Alternatives to Refuse Disposal

Boise Center for Urban Research, Idaho.\*\*League of Cities-Conference of Mayors, Inc., Washington, D.C.\*Department of Housing and Urban Development, Washington, D.C. Assistant Secretary for Policy Development and Research.

Final rept.

AUTHOR: Baker, Jim; Ewlin, Mike; Hanstberger, Carol; Hansch, Phil  
E371461 Fld: 13B, 68C, 91A GRAI7725

May 77 104p

Rept No: DO-LCCM-EOI-77-009

Monitor: HUD/FES-1140

Prepared in cooperation with League of Cities-Conference of Mayors, Inc., Washington, D.C., Contract HUD-H-2196R.

**Abstract:** The researchers reviewed six alternative solid waste methods. The six alternatives considered were: continued landfill; household or source separation; pyrolysis; biodegradation; waste-based solid fuel production; incineration. The use of a sanitary landfill is virtually unavoidable now and in the near future. Whatever plan or alternative is adopted for Ada County, a certain percentage of waste or amount of residue will ultimately end up in a landfill. It is at the present, the most practical, least-cost method of disposing of garbage. However, the sanitary landfill is not without problems. For instance, the Hidden Hollow Sanitary Landfill, Ada County's primary landfill site, opened in 1971 and was expected to last up to 1986. However, due to an increasing volume of garbage, the life expectancy has been shortened and the closing date is now estimated to be about 1980. As citizens become familiar with more sanitary and productive methods of disposing and/or utilizing solid waste, traditional landfill techniques will become less acceptable. Also, as the cost of energy escalates, landfill will not be cost effective compared to processes that recover materials or energy from solid waste. (Portions of this document are not fully legible)

**Descriptors:** \*Solid waste disposal, \*Management planning, Garbage, Sanitary landfills, Reclamation, Materials recovery, Land use, Refuse disposal, Marketing, Separation, Site surveys, Paper, Metals, Iron, Aluminum, Wood wastes, Plastics, Leather, Incinerators, Biodegradation, Fuels, Water pollution control, Government policies, Regulations, Geology, Demography, Cost analysis, Financing, Idaho

**Identifiers:** Ada County (Idaho), Waste recycling, Pyrolysis incineration, Refuse derived fuels, Source separation, NTIS/DOE

PB-272 129/85T NTIS Prices: PC A06/MF A01

The Feasibility of Utilizing Solid Wastes for Building Materials.  
Executive Summary

Ebon Research Systems, Silver Spring, Md.\*Municipal Environmental  
Research Lab., Cincinnati, Ohio.

AUTHOR: Jackson, Gilbert; Ware, Sylvia  
E352463 Fld: 13B, 13C, 68C, 50C, 89G GRAI7723

Jun 77 96p

Contract: EPA-68-03-2460-1, EPA-68-03-2056

Monitor: EPA/600/8-77/006

Abstract: This report focuses on two phases of a suggested four phase study to evaluate the technological and commercial possibilities of waste - derived composites. The first phase involved a joint and comprehensive literature search to identify wastes with potential as building materials. Limited laboratory studies were conducted on composite materials produced from the more promising wastes investigated. A composite material was defined as a product containing a filler, a reinforcement and a matrix. Various characteristics were considered desirable for the filler, the reinforcement and the matrix. The wastes identified through the literature search were evaluated against these desirable properties. A listing of the evaluative criteria and the rating system used is presented. Filler materials reviewed included fly ash, crushed glass, phosphate slimes, silicate waste, shredded refuse, waste plastic, wood bark, rice hulls, taccrite, red mud, coal waste foundry ash and sawdust. Reinforcement materials reviewed included carbonized lignin, bagasse, wheat straw, bark, kenaf, bamboo, wood chips, cotton waste and glass roving. Sewage sludge, sawdust, rice hulls, plastic scrap and waste glass also received attention as reinforcements.

Descriptors: \*Construction materials, \*Solid waste disposal, \*Industrial wastes, \*Reclamation, Management planning, Composite materials, Reinforcement (Structures), Fillers, Fly ash, Glass, Agricultural wastes, Taccrite, Bauxite, Phosphates, Slimes, Refuse disposal, Silicates, Shredding, Plastics, Bark, Wood wastes, Sawdust, Tailings, Sludge disposal, Design criteria, Utilization

Identifiers: Waste recycling, Mine wastes, Plastic recycling, Glass recycling, Rice hulls, Red mud, Sewage sludge, NTISEPACPD

PB-271 C07/7ST NTIS Prices: PC A05/MF A01

Impacts of Material Substitution in Automobile Manufacture on Resource Recovery. Volume II. Appendices A-E

IR and T, Arlington, Va.\*Environmental Protection Agency, Washington, D.C. Office of Research and Development.

Final rept.

AUTHOR: Fenner, Roy; Reig, Robert W.; Jones, T.; Weaver, C.  
E2891F4 Fld: 13B, 13F, 11F, 11I, 68C, 85, 91A, 71 GRAI7717  
Jul 76 168p  
Rept No: IRT-403-E-Vol-2  
Contract: EPA-68-01-3142  
Monitor: EPA/600/5-76/007t  
See also Volume 1, PE-257 542.

Abstract: Probable changes in the mix of materials used to manufacture automobiles were examined to determine if economic or technical problems in recycling could arise such that the 'abandoned automobile problem' would be resurrected. Future trends in materials composition of the automobile were quantified, and possible constraints related to material characteristics, availability, and price were examined. The automobile resource recovery industry was studied in terms of economic incentives for recycling and technical obstacles to recycling of deregistered automobiles. A macro-model of the economy, the EPA sponsored SFAS model, was used to study overall economic and environmental effects and to bring to light any secondary effects that might be important. This volume contains appendices covering the following subjects: (1) Future Material Composition in Automobiles; (2) Projections of Automobile Sales by Weight Class; (3) Automotive Use of Plastics and Recycling Possibilities; (4) Safety Aspects of Materials Substitution; (5) Energy Consequences.

Descriptors: \*Automobile industry, \*Solid waste disposal, \*Materials recovery, \*Materials replacement, Substitutes, Separation, Collection, Shredding, Metal scrap, Aluminum, Plastics, Forecasting, Supply(Economics), Demand(Economics), Commodity management, Abandonment, Economic analysis, Manufacturing, Safety, Trends

Identifiers: \*Waste recycling, Metal recycling, Plastics recycling, Secondary materials industry, Junk car disposal, NTISEPACHD

PB-267 568/4ST NTIS Prices: PC A08/MF A01

Disposal Study (Tires and Other Polymeric Materials)

Monsanto Research Corp Dayton Ohio Dayton Lab (401865)

Final rept.

AUTHOR: Hadley, W. H.; Ctvrtnicek, T. E.; Search, W. J.

E2573D1 Fld: 13B, 68C GRAI7715

Aug 76 148p

Rept No: MRC-DA-478

Contract: IAAK03-74-C-0136

Project: 1T762720DC48

Task: 02

Monitor: NAFADCOM-TR-76-25-FSI

Abstract: The purpose of this study was to evaluate the technical and economic feasibility of various methods of tire disposal. Over thirty processes for the disposal of tires and their interrelationships were investigated. The following four promising process alternatives involving combinations of these processes were recommended for further investigation: (a) Mechanical shearing followed by incineration. (b) Landfill after mechanical shearing. (c) Use in asphalt substances after the combined size reduction processes (mechanical shredding followed by cryogenic shredding). (d) Selling the by-products of the combined size reduction processes. (Author)

Descriptors: \*Tires, \*Waste disposal, Polymers, Army equipment, Military facilities, Economic analysis, Incinerators, Asphalt, Cryogenics, Feasibility studies, Materials recovery, Waste recycling, Solid wastes, Shredding, Pyrolysis, Environmental protection

Identifiers: Solid waste disposal, \*Tire recycling, Sanitary landfills, Pavements, Elastomers, NTISDOLXA

AD-A039 453/6ST NTIS Prices: PC A07/MF A01

Utilization of Elastic Recovery Materials for the Development of Crew Transfer Tunnels, Airlocks, and Space Maintenance Hangars. Part II. Expandable Modular Crew Transfer Tunnel Design, Fabrication, and Testing

Goodyear Aerospace Corp Akron Ohio (156 800)

Final rept. Nov 64-Jan 66  
AUTHOR: Hoffman, Thomas L.  
D2341E2 Fld: 22B, 22A d7713  
Jun 66 192f  
Rept No: GER-1233E  
Contract: AF 33(615)-2114  
Project: AF-8170  
Task: 817004  
Monitor: AFAPL-TF-66-2-Pt-2  
See also Part 1 dated Jan 66, AD-489 344.  
Distribution limitation now removed.

Abstract: This report summarizes the design, analysis, fabrication, and testing of the expandable Gemini to Manned Space Station (MSS) modular crew transfer tunnel. The program established the design of a 3.5-ft dia modular tunnel to be used as a pressurized meteoroid protective enclosure for astronauts transferring from the Gemini capsule to the MSS. The transfer tunnel attaches to the elliptical Gemini hatch at one end and to the circular MSS hatch at the other end. A prototype tunnel was fabricated and tested to establish design feasibility. Tunnel construction is a composite wall consisting of an inner triple-barrier pressure bladder for gas retention, a 4-ply Dacron cloth structural layer, a 2-in. thick polyether foam meteoroid barrier, and a film-cloth laminate outer cover with a thermal coating. The expandable composite wall is structurally bonded to a rigid aluminum honeycomb sandwich floor to which the packaging canister is attached when the tunnel is folded to constitute a modular unit. Pressure proof testing for 7 days at 10 psi and cyclic pressure testing from vacuum to the nominal operating pressure of 7.5 psi for 60 cycles established the structural integrity. Pressure leak testing under ambient conditions for 7 days at 7.5 psi established the gas tightness of the structure with a leak rate of 0.50 lb/day of inflation gas under orbital conditions. Pressure leak testing in a vacuum chamber at an average vacuum of  $4 \times 10^{-5}$  mm Hg for one day established a leak rate of 0.40 lb/day of inflation gas under orbital conditions.

Descriptors: (\*Manned spacecraft, Space maintenance), (\*Space maintenance, \*Expandable structures), (\*Astronauts, Protective coverings), Orbits, Space environments, Meteors, Flexible structures, Expanded plastics, Textiles, Elastic webbing, Composite materials, Pressurization, Thermal insulation, Hangars

Identifiers: Crew transfer tunnels, Gemini, NTISDODXD

AD-489 451/5ST NTIS Prices: FC A09/MF A01



Utilization of Elastic Recovery Materials for the Development of Crew Transfer Tunnels, Airlocks, and Space Maintenance Hangars. Part I. Space Maintenance Hangar Design Study

Goodyear Aerospace Corp Akron Ohio (156 800)

Final rept. May-Oct 65

AUTHOR: Eoffman, Thomas I.

D233513 Fld: 22E, 22A d7713

Jan 66 99p

Rept No: GER-12348

Contract: AF 33(615)-2114

Project: AF-8170

Task: 817004

Monitor: AFAPL-TF-66-2-Pt-1

See also Part 2 dated Jun 66, AD-489 451.

Distribution limitation now removed.

Abstract: The program established the preliminary design, supported by preliminary analysis, of a 9-foot diameter cylindrical structure with an expanded length of 25 feet which attaches to the aft end of the MOI to serve as a pressurized meteoroid protective enclosure for astronauts working on MOI experiments. The expandable hangar construction is a composite wall consisting of an inner triple-barrier pressure bladder for gas retention, a web strap structural layer, a 2-inch thick polyether foam meteoroid barrier, and a film-cloth laminate outer cover with a thermal coating. The web straps carry the longitudinal pressure loads while the circumferential pressure loads are distributed from the web straps to a series of intermittently-spaced wire cable circumferential hoops. Flexible clam shell doors mounted to rigid frames at the aft end of the hangar can be opened and closed by a reel and cable system to provide an opening for large objects to pass thru when the hangar is unpressurized. The extended length of the hangar is maintained when unpressurized by 3 inflated 10 inch diameter full length deployment tubes while the shape is maintained by the foam barrier. Fabrication of the hangar, which is estimated to weigh 1459 pounds including the packaging canister, is entirely feasible and within the present state of the art. (Author)

Descriptors: (\*Space maintenance, \*Expandable structures), (\*Manned spacecraft, Space maintenance), Orbits, Space environments, Meteors, Protective coverings, Astronauts, Expanded plastics, Textiles, Composite materials, Elastic webbing, Pressurization, Thermal insulation, Hangars

Identifiers: Gemini, NTISDOCXD

AD-489 344/2ST NTIS Prices: PC A05/MF A01

## The Potential for Reusable Homogeneous Containers

Stanford Research Inst., Menlo Park, Calif. Center for Resource and Environmental Systems Studies.\*National Science Foundation, Washington, D.C. Research Applied to National Needs.

Interim rept.

Goen, Richard L., Steele, Robert V., Somogyi, Laszlo P., Fishman, Norman

D2235E3 Fld: 13B, 13K, 6H, 68C, 98H, 91A GRAI7712

Feb 77 56p

Rept No: SRI/CRESS-17

Grant: NSF-AER76-02396

Project: SRI-EGU-5674

Monitor: NSF/PA-770030

Abstract: This study examines the feasibility of reusable containers for food products (excluding beverages). Chapter I reviews the conclusions of the many studies of reusable beverage containers. Chapter II reviews the food packaging share of the packaging market, the contribution of food packaging to the generation of solid waste, and the quantities of food used in the food service industry. Chapter III presents concepts for reusable food containers--glass or plastic. Chapter IV discusses two types of systems for the return of the containers after use. Chapter V derives the total energy use for a glass reusable container system, and for one configuration and size of a plastic reusable container system.

Descriptors: \*Solid waste disposal, \*Containers, \*Food packaging, \*Management planning, Glass, Plastics, Energy consumption, Reclamation, Cost estimates

Identifiers: \*Solid waste abatement, Reusable materials, NTISNSFRA, NTISSPI

PE-265 10C/8ST NTIS Prices: PC A04/MF A01

## Fibers as Renewable Resources for Industrial Materials

National Research Council, Washington, D.C. Committee on Renewable Resources for Industrial Materials.\*National Science Foundation, Washington, D.C. Div. of Policy Research and Analysis.

Bethel, James S.

D222213 Fld: 2C, 11E, 11L, 68\*, 97G\*, 71J, 71R GFAI7712

1976 271p\*

Contract: NSF-STF75-01069

Monitor: NSF/PRA-7501069-7-7

See also PB-257 357.

Abstract: ;Contents: The pulp, paper and paperboard industry introduction--(Assessment of the industry, some factors affecting the industry, enhancement of availability and utility of materials with reduction in costs, enhanced role of renewable fiber resources - an overview of product substitution, identification of educational roles and needs, and recommended research, its costs and returns, and time schedules); Plant fibers other than wood and cotton; The textile industry--(Cotton, wool and mohair, the cellulose and synthetic fibers); Feathers, furs and leather.

Descriptors: \*Natural fibers, \*Energy conservation, \*Environmental impacts, Assessments, Cost estimates, Economics, Paper industry, Textile industry, Plants(Botany), Fiber crops, Cotton plants, Wool, Hair, Cellulosic resins, Synthetic fibers, Leather, Feathers, Performance evaluation, Forecasting, Supply management, Paperboards, Forestry, Law enforcement, Water pollution, Air pollution, Utilization, Byproducts

Identifiers: Renewable resources, NTISNSFPBA, NTISNASNRC

PE-264 561/2ST NTIS Prices: PC A12/MF A01

Photodegradable Polyolefin Composition Containing an N-Halo Lactam

Department of Agriculture, Washington, D.C. (108 800)

Patent

Freedman, Bernard, Diamond, Martin J.  
D2101G1 Fld: 111, 7C, 9CB, 710, 99C GRAI7711

Filed 2 Apr 76, patented 22 Feb 77 6p

Rept No: EAT-APFI-673 C12, PATENT-4 009 324

Monitor: 18

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, D.C. 20231 \$0.50.

Abstract: Polyolefins capable of photodegradation are prepared by incorporating in the polyolefin an additive which contains chlorine, bromine, or iodine directly linked to the nitrogen atom of an amide or imide group. Containers fabricated from the plastics of the invention when exposed to sunlight will gradually decompose and eventually crumble away. Thus, such containers when thrown along the roadside will eventually become part of the soil. Films prepared from the plastics of the invention when used for agricultural purposes will gradually become friable by the action of sunlight so that they can be readily plowed into the soil, thereby helping to control pollution of plastics.

Descriptors: \*Patents, \*Synthesis (Chemistry), \*Olefin resins, Photodegradation, Additives, Chlorine organic compounds, Bromine organic compounds, Iodine organic compounds, Halogen organic compounds, Thermal degradation, Nitrogen organic compounds, Plastics, Films, Solid waste disposal, Pollution, Imides, Amides

Identifiers: PAT-CL-526-6, NTISGPAG

PE-264 675/OST NTIS Prices: Not available NTIS

An Investigation of the Potential for Resource Recovery from Demolition Wastes

Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.\*National Science Foundation, Washington, D.C. Research Applied to National Needs. (220 022)

Wiesman, Richard M., Wilson, David Gordon

D1641H2 Fld: 13C, 50C, 68C, 89G, 91A GRAI7708

Oct 76 214p

Grant: NSF-AEN75-14197

Monitor: NSF/RA-760336

Abstract: This report evaluates the potential for recovering materials from the wastes resulting from the demolition of buildings. The objectives are: (1) to determine the total quantity and material make-up of demolition wastes produced annually in the United States; (2) to examine potential and hypothetical new technologies and applications which, when applied to resource recovery from demolition wastes, could be economically favorable; and (3) to examine cost specifications for economic viability of potential resource-recovery operations on demolition wastes. An input analysis is made to determine the probable contents of demolition wastes in recent years in three U.S. cities--Atlanta, Boston, and Los Angeles. A process flow chart for a hypothetical demolition-waste treatment center is drawn up and the operations of such a center are analyzed. It is concluded that such a center should be profitable in urban areas where concrete aggregate is in short supply and where landfills taking mixed wastes are distant and expensive.

Descriptors: \*Solid waste disposal, \*Construction materials, \*Buildings, \*Materials recovery, Demolition, Waste processing, Separation, Steels, Aluminum, Lead (Metal), Concretes, Wood, Plastics, Salvage, Bricks, Glass, Economic analysis, Cost estimates, Copper, Forecasting

Identifiers: \*Waste recycling, Secondary materials industry, NTISNSFPA

PB-262 339/5ST NTIS Prices: PC A10/MF A01

Environment and Packaging with Consideration of the Recycling of Packaging Wastes

Rationalisierungs-Kuratorium der Deutschen Wirtschaft (RKW) e.V.,  
Frankfurt am Main (Germany, F.R.). Rationalisierungsgemeinschaft  
Verpackung (RGV). (5421400)

Moser, W.

D1264A4 Fld: 13B, 13D, 68C, 71, 91A GRAI7705

1975 18p

Monitor: 18

Symposium on recycling: an example from the glass industry,  
Dusseldorf, German, Federal Republic of (F.R. Germany), 13 May 1975.  
U.S. Sales Only. In German.

Abstract: The subjects discussed include: kinds of wastes, particularly packaging wastes and presently used waste disposal methods; the quantity of these wastes and their recycling; can the problems of recycling, processing, disposal, and reuse of municipal, especially household, wastes be solved; and effective beneficial solutions for eliminating adverse environmental effects caused by packaging wastes. Tabulated data are presented on material consumption and waste production by glass, plastic, metallic, paper, and other material packaging in US, France, West Germany; percent of packaged wastes attributable to each of these materials as used in those three countries plus England and Switzerland; the environmental effects and costs of the wastes produced; and the comparative cost of handling, processing, recycling, reusing, disposing, or burning packaging wastes. (ERA citation C2:003384)

Descriptors: \*Recycling, \*Packaging, Solid wastes, Waste disposal, Economics, Environmental effects, France, Glass, Materials recovery, Metals, Paper, Plastics, Switzerland, United Kingdom, USA, Waste processing

Identifiers: ERDA/320305, ERDA/420900, West Germany, \*Solid waste disposal, \*Waste recycling, Refuse disposal, NTISERDAE

CCNF-7505106-5 NTIS Prices: PC A02/MF A01

## Possibilities of Separating Household Wastes

Rationalisierungs-Kuratorium der Deutschen Wirtschaft (EKW) e.V.,  
Frankfurt am Main (Germany, F.R.). Rationalisierungsgemeinschaft  
Verpackung (RGV). (542140C)

Hoberg, H., Schulz, E.

D1264A3 Fld: 13E, 68C, 71, 91A GRAI7705

1975 28p

Monitor: 18

Symposium on recycling: an example from the glass industry,  
Dusseldorf, German, Federal Republic of (F.R. Germany), 13 May 1975.  
In German.

Abstract: The need for recycling household wastes in order to save raw materials and to protect the environment is discussed. Methods used in the USA and in West Germany to separate glass, aluminum, plastics, iron scrap, nonferrous metals, and paper from household wastes are described. The experimental facility in Aachen which uses magnetic, optical, pneumatic, hydraulic, and cyclone separators to recover these substances from garbage is described. (ERA citation 02:003383)

Descriptors: \*Aluminium, \*Glass, \*Metals, \*Paper, \*Plastics, \*Solid wastes, Environmental effects, Materials recovery, Recovery, Recycling, Separation processes

Identifiers: ERDA/320305, ERDA/420900, West Germany, \*Waste recycling, \*Solid waste disposal, Separators, Refuse disposal, NTISERDAE

CCNF-7505106-4 NTIS Prices: PC A03/MF A01

# Packaging Source Reduction: Can Industry and Government Cooperate

Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs.

Claussen, Eileen I.

D1244D1 Fld: 13B, 13D, 5C, 68C, 96A GFAI7705

1974 20p

Rept No: EPA/530/SW-136

Monitor: 18

Paper presented at the Annual National Forum of the Packaging Institute on 9 Oct 74.

Abstract: This paper discusses the issues of resource use and its effect on the ecosphere, government policies, and industrial attitudes.

Descriptors: \*Solid waste disposal, \*Packaging, \*Government policies, \*Industrial management, Economic analysis, Trends, Containers, Management planning, Paper, Glass, Steel, Aluminum, Plastics, Wood, Regulations, Tables(Data), Attitudes

Identifiers: NTISEPASW

PB-260 634/1ST NTIS Prices: PC A02/MF A01



## Energy and Economic Impacts of Mandatory Deposits

Research Triangle Inst., Research Triangle Park, N.C.\*Franklin Associates, Prairie Village, Kans.\*Federal Energy Administration, Washington, D.C. Conservation Policy Office. (304 400)

Final rept.

DO215K2 Fld: 5C, 5D, 13B, 68C\*, 91A\*, 96A\*, 97 GFAI77C1

Sep 76 752p\*

Contract: FEA-CO-04-50175-00

Monitor: FEA/D-76/406

Prepared in cooperation with Franklin Associates, Prairie Village, Kans. See also PB-258 637.

Abstract: This study examines the energy, capital and labor impacts that would be caused by a five cent deposit on beer and soft drink containers. The study examines the range of potential impacts that could occur given various market responses to a nationwide mandatory deposit law.

Descriptors: \*Solid waste disposal, \*Containers, \*Government policies, \*Incentives, Economic analysis, Costs, Regulations, Legislation, Forecasting, Bottles, Metal industry, Beverages, Management planning, Plastics, Glass, Employment, Prices, Electric power consumption, Systems analysis

Identifiers: \*Beverage containers, \*Container deposits, Waste recycling, Solid waste abatement, NTISXFEA

PB-258 638/6ST NTIS Prices: PC A99/MF A01

Inventory and Analysis of Materials Life Cycle Research and Development in the Federal Government Fiscal Year 1976. Phase I Report  
Federal Council for Science and Technology, Washington, D.C. CCMAT Task Force 1.

Interagency rept.

DOC73A3 Fld: 5A, 8I, 11F, 70E\*, 48A\*, 71\* GRAI7626

Apr 76 75p\*

Rept No: FCCSET-1-76

Moniter: 18

Abstract: This report describes and analyzes the life cycle materials R&D funded by the Federal Government in FY 76. A computerized inventory was produced by the 18 agencies involved in materials R&D. The inventory identified approximately one billion dollars of funding in this area, and permitted analysis by funding agencies, R&D performers, broad national goals, specific objectives, stages in the materials life cycle, and materials or materials categories. The CCMAT definition of materials includes everything except food and drugs, from exploration through mining, processing, manufacturing, application, recycling, and disposal. The inventory was developed to meet the need for better coordination between the various government agencies to assist in program planning and budgeting.

Descriptors: \*Research management, \*National government, \*Materials, \*Raw materials, \*Financing, Minerals, Metals, Ceramic materials, Agricultural products, Polymers, Natural resources, Mining, Production, Industries, Tests, Solid waste disposal, Reclamation, Government policies, Economic analysis, Inventories

Identifiers: Waste recycling, NTISDIBM

PE-258 535/4ST NTIS Prices: PC\$4.50/MF\$3.00

# Review of Studies of the Radiation Modification of Elastomers

Foreign Technology Div Wright-Patterson AFB Ohio (141 600)

Achmatowicz, T., Smigasiwicz, Z., Zielinski, W.

DOC14F4 Fld: 7E, 11J d7626

22 Jul 69 21p

Rept No: FTD-HT-23-1034-68

Monitor: 18

Edited trans. of Nukleonika (Poland) v10 p395-408 1965.

Distribution limitation now removed.

**Abstract:** The influence of ionizing radiation on the vulcanization of natural rubber, latex, and sulfur vulcanates of butyl rubber as well as the role played by solid additives (oxides and halides of metals, and organic sensitizers) was investigated. Natural rubber with inorganic additives undergoes crosslinking under gamma radiation, and the rate of crosslinking increases with the atomic number of the metal with the exception of CuO and PbO. Chloroform was studied as an organic sensitizer, and this compound greatly accelerates the crosslinking process. Polyisobutylene and the vulcanates of butyl rubber undergo deep gradation under gamma radiation; however, the degradation products have valuable properties and may be used for production of sealing compositions. Radiation methods for reclamation of old motor tires and old butyl tubes were developed. (Author)

**Descriptors:** (\*Rubber, \*Radiation chemistry), (\*Vulcanization, Radiation chemistry), (\*Tires, Reclamation), Crosslinking (Chemistry), Gamma rays, Vulcanizates, Acetonitrile, Butyl rubber, Poland

**Identifiers:** \*Graft polymerization, Metals, Oxides, Polyisobutylene, Translations, NTISDCDXL

AD-860 227/8ST NTIS Prices: PC\$3.50/MF\$3.00

## Renewable Resources for Industrial Materials

National Research Council, Washington, D.C. Committee on Renewable Resources for Industrial Materials.\*National Science Foundation, Washington, D.C. Div. of Policy Research and Analysis.

Bethel, James S.

C7692D4 Fld: 2C, 1CA, 97G\* GRAI7625

Sep 76 280p\*

Contract: NSF-STP75-01069

Monitor: NSF/PRA-1

Abstract: The concept of the Reference Materials System (RMS) is used as a framework for material assessment and, more specifically, to address the substitution of renewable materials for nonrenewables in particular end uses. The orderly and rational development of national goals for renewable resources requires the evaluation of alternative materials supply systems in terms of resource supply; available technology; and energy, manpower, and capital requirements.

Descriptors: \*Natural resources, \*Forestry, \*Agriculture, \*Energy conservation, Wood products, Farm crops, Cotton plants, Soybean plants, Elastomers, Leather, Hides, Algae, Fishes, Solid wastes, Refuse, Biomass, Textiles, Paper products, Paperboards, Farm management, Production management, Supply management, Energy management, Substitution

Identifiers: Renewable resources, Fuel substitution, NTISNASNRC, NTISNASNRC

PE-257 357/4ST NTIS Prices: PC\$9.25/MF\$3.00

Paper and Plastic Solid Waste Sacks. A Summary of Available Information

Environmental Protection Agency, Cincinnati, Ohio. Office of Solid Waste Management Programs.

Open-file rept.

Gruppenhoff, Betty L., Shuster, Kenneth A.

C749312 Fld: 13E GRAI7623

1971 20p

Rept No: TC-18.1.C37/1

Monitor: 18

Abstract: Sacks for storing solid waste were initially tried in Europe but recently--within about the last 12 years--their use has spread to the United States. Much research has been done on solid waste sacks, both paper and plastic. Many communities have tried paper sacks, plastic sacks, or both in test areas to determine their acceptability as solid waste storage containers and to identify their effect on solid waste collection and disposal. The purpose of this paper is to summarize what research has been done and the reported findings of the many test and community-wide programs on this subject.

Descriptors: \*Solid waste disposal, \*Bags, \*Paper, \*Elastics, Packaging materials, Storage, Collection, Performance evaluation, Management planning, Refuse disposal

Identifiers: NTISEPAC, NTISEPASW

FE-256 960/6ST NTIS Prices: PC\$3.50/MF\$3.00

Water Resistant Polymer Coatings for Water Soluble Glass Packaging Containers. Progress Report No. 4. Design and Evaluation of a Water Disposable Glass Packaging Container

Clemson Univ., S.C. Div. of Interdisciplinary Studies.\*Bureau of Solid Waste Management, Cincinnati, Ohio. (407 108)

Master's thesis

Kay, Donald A.

C749311 Fld: 11C, 11E, 13D GRAI7623

May 71 81p

Grant: PHS-EC-00033

Monitor: 18

Abstract: The principal objective of this research was to develop a water resistant protective coating in order to render water soluble glass suitable for utilization as a container structure. Two alternative approaches can be used to apply such coatings: (1) apply an inorganic coating (this is currently being done in another research group using vapor deposition methods), or (2) apply an organic or polymer coating. The research described here deals with the development of the latter approach. The final coated structure might be employed as a container for such items as soft drinks, beer, food, detergents, etc.

Descriptors: \*Glass, \*Containers, \*Bottles, \*Waterproof coatings, \*Polymers, Solid waste disposal, Protective coatings, Adhesion, Surface finishing, Chemical resistance, Sodium silicates, Theses

Identifiers: \*Solid waste abatement, \*Water soluble glass, Beverage containers, NTISEPAC, NTISEPASW

PE-256 931/7ST NTIS Prices: PC\$5.00/MF\$3.00

Comparative Estimates of Post-Consumer Solid Waste

Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs.

Smith, Frank A.

C740313 Fld: 13B, 68C GRAI7622

May 75 22p

Rept No: EPA/530/SW-148

Monitor: 18

Abstract: This report provides data on the total quantity of residential and commercial solid waste composition for the years 1968, 1970, and 1971. The results of several national surveys are compared and evaluated.

Descriptors: \*Solid waste disposal, \*Management planning, \*Surveys, Refuse disposal, Collection, Composition(Property), Tables(Date), Paper, Glass, Metals, Plastics, Elastomers, Leather, Textiles, Wood, Agricultural wastes, Food

Identifiers: NTIS EPAO

PF-256 491/2ST NTIS Prices: PC\$3.50/MF\$3.00

## Decision-Makers Guide in Solid Waste Management

Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs.

Colonna, Robert A., McLaren, Cynthia

C7133H3 Fld: 13E, 68C\*, 91A\*, 43F GRAI7620

1974 153p\*

Rept No: EPA-SW-127

Monitor: 18

**Abstract:** This guide presents the key issues of solid waste management in a decision-making context. It attempts to anticipate all of the important decisions which local government managers must make in the effort to develop and operate solid waste programs in a responsive, cost-effective manner. Each chapter presents an issue, describes the alternatives, gives the advantages and disadvantages, and concludes with a summary statement which may include an EPA recommendation on the issue. Four basic categories of criteria by which decisions are made in this field are the following: costs, environmental factors, resource conservation, and institutional factors.

**Descriptors:** \*Solid waste disposal, \*Management planning, \*Economic analysis, Government policies, National government, Regulations, Cost effectiveness, Environmental impacts, Air pollution, Water pollution, Esthetics, Fuels, Materials recovery, Land use, Legislation, Financing, Collection, Separation, Manpower, Transportation, Sanitary landfills, Tires, Lubricating oils, Paper, Plastics, Sludge disposal, Hazardous materials, Incentives, Baling, Shredding, Incinerators, State government, Local government

**Identifiers:** \*Waste recycling, Waste transfer stations, Tire recycling, Oil wastes, NTISEPAC

PE-255 140/6ST NTIS Prices: PC\$6.75/MF\$3.00



Resource Recovery and Source Reduction. First Report to Congress

Environmental Protection Agency, Cincinnati, Ohio. Solid Waste Management Office.

C7063L2 Fld: 13E, 68C, 91A GRAI7619

1974 70p

Rept No: EPA-SW-118

Monitor: 18

Abstract: Section 205 of the Solid Waste Disposal Act (Public Law 89-272) as amended requires the U.S. Environmental Protection Agency (EPA) to undertake an investigation and study of resource recovery. This document, which represents EPA's Report to the President and the Congress, summarizes the Agency's investigations to date and reports on the manner in which the congressional mandate is being performed. The findings of this report are based on a number of contractual efforts and analyses by the Agency staff performed since the passage of the Resource Recovery Act. The report is organized into a summary, four major sections, and two appendixes. The first section discusses the problem to which resource recovery is the potential solution. Next, key findings related to resource recovery are presented. A section outlining major options follows. The report concludes with a discussion of EPA's program activities in resource recovery. The appendix presents summaries of information about the status of resource recovery, according to material categories and lists existing resource recovery facilities.

Descriptors: \*Solid waste disposal, \*Materials recovery, \*Management planning, Reclamation, Refuse disposal, Fuels, Legislation, Paper, Iron alloys, Steels, Aluminum, Copper, Lead(Metal), Zinc, Glass, Plastics, Textiles, Cost estimates, Metal scrap, Process charting

Identifiers: \*Waste recycling, Secondary materials industry, NTISEPAC

PB-255 139/8ST NTIS Prices: PC\$4.50/MF\$2.25

## Incentives for Recycling and Reuse of Plastics

Little (Arthur D.), Inc., Cambridge, Mass.\*Environmental Protection Agency, Cincinnati, Ohio. Solid Waste Management Office. (208 850)

Summary rept.

C7051F4 Fld: 13B, 11I, 68C, 710, 91A GRAI7619

1973 22p

Contract: PHS-CPE-R-70-0048

Monitor: EPA-SW-41c.1

See also PB-214 045.

Abstract: Plastics are one of the major materials in use today, and in the 1980's more products will probably be made from plastics than from any other material including steel. At the disposal site, plastics represent an average of less than 2 percent of the solid waste stream today, and even at the projected rapid rate of growth of plastic use, plastic wastes are not expected to exceed an average of 3 percent by 1980. This projection assumes little or no change in the material composition of the solid waste stream. If, however, other materials such as paper, metal, and glass are recycled, the percentage of plastics in solid wastes will increase. But in contrast to the other major materials, plastics are not now being extensively recycled from the consumer. This study, therefore, examines the possibility of promoting the recycling of plastics--considering the technical and economic impediments; and it further provides the methodology for investigating other materials in the disposal area.

Descriptors: \*Solid waste disposal, \*Plastics, \*Materials recovery, Utilization, Resources, Economic analysis, Refuse disposal, Government policies, Reclamation, Incentives, Taxes, Collection, Separation, Cost analysis, Scrap, Management planning

Identifiers: \*Waste recycling, Plastics recycling, Polymer additives, NTISFPAI

PE-254 619/OST NTIS Prices: PC\$3.50/MF\$2.25

Status of the Mineral Industries - 1976

Bureau of Mines, Pittsburgh, Pa. Pittsburgh Mining and Safety Research Center. (407 105)

Special pub.

Bowser, Merle L.

C7043J2 Fld: 81, 50, 48A, 96A GRAI7619

May 76 25p

Rept No: BuMines-SP-2-76

Monitor: 18

See also report dated Jul 75, PI-252 846.

Abstract: The Bureau of Mines has prepared charts highlighting certain aspects of the status of mineral industries. Diagrams present information concerning mining, minerals, metals, and mineral reclamation.

Descriptors: \*Raw materials, \*Fossil fuels, \*Solid waste disposal, \*Economic analysis, \*Commodity management, Supply(Economics), Demand(Economics), Mineral economics, Metal industry, Materials recovery, International trade, Plastics, Graphs(Charts), Graphic methods

Identifiers: \*Mineral industries, NTISDIEM

PB-254 448/4ST NTIS Prices: PC\$3.50/MF\$2.25

# Recycling Trends in the United States: A Review

Bureau of Mines, College Park, Md. College Park Metallurgy Research Center.

Information circular 1976

Spendlove, Max J.

C7C35A3 Fld: 13B, 68C\*, 91A\* GFAI7619

May 76 29p\*

Rept No: EuMires-IC-8711

Mcritor: 18

Abstract: Support for recycling in the United States is indicated by the growing deficits in the national economy originating primarily in the mineral supply system. The demand for goods and services of mineral origin has increased markedly in unison with the national economic growth. Concurrently, the Nation's ability to supply these growing demands from domestic resources has faltered seriously. On a value base of current U.S. dollars, the 1971 gross national product (GNP) of \$1,055 billion was accompanied by a national mineral deficit of \$4 billion. At the end of 1974, the GNP had reached \$1,397 billion, and the mineral deficit was \$24 billion. The relatively low probability of meeting future deficits by discovering large new domestic resources or by significantly improving minerals supply and/or energy conversion technologies in the near future emphasizes the importance of recycling. The following discussions dwell almost exclusively with situations and systems in the U.S. mineral supply economy. Although no data on other countries are readily available, there is little doubt that similar if not identical parallels can be drawn for any other of the more advanced nations.

Descriptors: \*Solid waste disposal, \*Materials recovery, Refuse disposal, Collection, Composts, Incinerators, Metal scrap, Economic analysis, Fuels, Plastics, Glass, Paper, Marketing, Government policies, Copper, Lead, Zinc, Management planning, Incentives, Resources

Identifiers: \*Waste recycling, Secondary materials industry, Metal recycling, Materials shortages, NTISDIEM

PE-254 222/3ST NTIS Prices: PC\$4.00/MF\$2.25

# Resource and Environmental Profile Analysis of Nine Beverage Container Alternatives

Midwest Research Inst., Kansas City, Mo.\*Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs. (230 350)

Final rept.

Hunt, Robert G., Franklin, William E., Welch, Richard O., Cross, James A., Woodall, Alan E.

C6952H3 Fld: 13E, C&I, 68C, 48A, 71 GRAI7618

1974 185p

Contract: EPA-68-C1-1848

Monitor: EPA/530/SW-91c

**Abstract:** This study is a resource and environmental profile analysis (REPA) of nine beverage container options. The analysis encompassed seven different parameters: virgin raw materials use, energy use, water use, industrial solid wastes, post-consumer solid wastes, air pollutant emissions and water pollutant effluents. These parameters were assessed for each manufacturing and transportation step in the life cycle of a container, beginning with extraction of the raw materials from the earth, continuing through the materials processing steps, product fabrication, use and final disposal. The nine container systems encompass four basic raw materials--glass, steel, aluminum and plastic. The specific package selected for study was beer containers. However, resource and environmental profiles of soft drink containers were also made on a basis of 1,000 liters of beverage delivered; although in the case of soft drinks, 16-ounce glass bottles were compared with 12-ounce cans and plastic bottles.

**Descriptors:** \*Containers, \*Solid waste disposal, \*Environmental impacts, \*Management planning, Raw materials, Bottles, Steels, Glass, Aluminum, Manufacturing, Electric power consumption, Plastics, Refuse disposal, Scrap, Extractive metallurgy, Air pollution, Water pollution, Beer, Beverages

**Identifiers:** Beverage containers, \*Waste recycling, Metal recycling, Glass recycling, NTISEPAOED

PE-253 486/5ST NTIS Prices: PC\$7.50/MF\$2.25

Resource Recovery and Source Reduction. Second Report to Congress

Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs.

C6952E4 Fld: 13E, 68C, 71, 91A GRAI7618

1974 125p

Monitor: 18

**Abstract:** This report examines the many and diverse issues associated with this field. Its five chapters discuss (1) projected trends in resource utilization, environmental pollution, and solid waste generation that give impetus to consideration of resource recovery and source reduction measures; (2) the effects of several existing Federal policies and programs on the level of use of virgin and recycled materials; (3) resource recovery systems and the markets for materials and energy recovered from post-consumer residential and commercial waste; (4) product controls, such as bans, standards, charges and deposits, directed at regulating the design or consumption of products for resource recovery or source reduction purposes; (5) studies of resource recovery and source reduction of several special wastes: automobiles, packaging, beverage containers, and rubber tires. A summary of key findings in these areas follows.

**Descriptors:** \*Solid waste disposal, \*Materials recovery, \*Reclamation, \*Management planning, Regulations, legislation, Government policies, Energy conservation, Environmental impacts, Trends, National government, Automobiles, Packaging, Containers, Tires, Raw materials, Supply (Economics), Demand (Economics), Economic analysis, Transportation, Taxes, Paper, Metal scrap, Glass, Steels, Plastics, Aluminum, Fuels, Refuse disposal

**Identifiers:** Secondary materials industry, \*Waste recycling, Junk car disposal, Beverage containers, Tire recycling, Metal recycling, Glass recycling, Paper recycling, NTISEPAL

PE-253 406/3ST NTIS Prices: PC\$5.50/MF\$2.25

# Status of the Mineral Industries

Bureau of Mines, Washington, D.C. (C68 450)

Special pub.

C6883J3 Fld: C8I, C5C, 48A, 96A GRAI7617

Jul 75 24p

Rept No: BuMines-SP-4-75

Monitor: 18

Abstract: The Bureau of Mines has prepared charts highlighting certain aspects of the status of mineral industries. Diagrams present information concerning mining, minerals, metals, and mineral reclamation.

Descriptors: \*Raw materials, \*Fossil fuels, \*Solid waste disposal, \*Economic analysis, \*Commodity management, Supply(Economics), Demand(Economics), Materials recovery, Mineral economics, Metal industry, Plastics, International trade, Graphs(Charts), Graphic methods

Identifiers: Waste recycling, Metal recycling, NTISDIEM

PE-252 846/1ST NTIS Prices: PC\$3.50/MF\$2.25

# Survey of Methods Used to Control Wastes Containing Hexachlorobenzene

TRW Systems Group, Redondo Beach, Calif.\*Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs. (354 595)

Final rept.

Quinlivan, S., Ghasseri, M., Sarty, M.

C6742D3 Fld: 13B, 07A, 68C\*, 99B, 68D GRAI7615

1976 92p\*

Contract: EPA-68-01-2956

Monitor: EPA/530/SW-120c

**Abstract:** This study presents the results of a survey of methods used to control wastes containing hexachlorobenzene (HCB). The specific objectives were to identify the sources and characteristics of manufacturing wastes containing HCB, to document methods used for treatment and disposal of HCB wastes, and to evaluate the environmental adequacy of the treatment and disposal methods.

**Descriptors:** \*Waste treatment, \*Solid waste disposal, \*Water pollution control, Pyrotechnics, Electrolysis, Chlorine aromatic compounds, Cost estimates, Industrial plants, Manufacturing, Pesticides, Solvents, Chlorobenzenes, Electrodes, Aluminum, Phenols, Wood preservatives, Cyanogen, Vinyl chloride, Synthetic elastomers, Storage, Transportation, Earthfill, Incineration, Materials recovery, Herbicides, Environmental surveys, Sodium halides, Chemical industries

**Identifiers:** \*Benzene/hexachloro, PCP herbicide, Cyanogen chloride, Sodium chlorates, Phenol/pentachloro, Ultimate disposal, NTISEPASW

PE-253 051/7ST NTIS Prices: PC\$5.00/MF\$2.25



## Tire Recycling and Reuse Incentives

International Research and Technology Corp., Washington, D.C.\*Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management Programs. (388 995)

Humpstone, Charles C., Ayres, Edward, Keahey, Sam G., Schell, Theodore C6735E1 Fld: 13E, 68C\*, 91A\* GRAI7615

1972 97p\*

Contract: FHS-CPE-B-70-0047

Monitor: EPA/530/SW-32c

Supersedes PB-234 602.

Abstract: Tires form a particularly intractable form of solid waste since they do not decompose, have an adverse effect on incinerators and air emissions, and disrupt the compaction process in sanitary landfills. The options for the disposal or recovery of used tires are described by this study as well as research into new methods of tire recovery. Rubber reclaimed from scrap tires can be used in new tire manufacture but lacks the uniformity, tensile strength, heat resistance and abrasion resistance to be used in very large concentrations. Pyrolysis, hydrogenization and related processes for separating tires into substances that may be recycled into tire production or sold as fuel, although workable on a laboratory scale, have not yet been proven commercially. The incorporation of chopped tires into an interface layer of asphalt between a deteriorated road and its new surfacing is a promising use of tires. A series of strategies was devised under which various economic, regulatory, educational, and research and development activities were combined to provide incentives to encourage the reuse of tires or improve tire disposal practices.

Descriptors: \*Tires, \*Solid waste disposal, Reclamation, Incinerators, Separation, Construction materials, Collection, Flexible pavements, Materials recovery, Government policies, Incentives, Management planning, Elastomers, Feasibility, Economic analysis

Identifiers: \*Tire recycling, Tire retreading, NTISEEASW

PB-252 602/8ST NTIS Prices: PC\$5.00/MF\$2.25

Disposal Study: (Tires and Other Polymeric Materials)

Monsanto Research Corp Dayton Ohio Dayton Lab\*Army Natick Development Center, Mass. (401865)

Technical rept.

Hedley, W. H., Ctvrtnicek, T. E., Search, W. J.

C6641C3 Fld: 13E, 15E, 68C\*, 74E GRAI7614

Apr 75 146p

Rept No: MRC-DA-478

Contract: DAAK03-74-C-C136

Monitor: 18

Abstract: The purpose of this study was to identify and evaluate the technical and economic feasibility of various methods of tire disposal including the use of a mobile scrap tire disposal unit for the Army's application. The quantities and approximate locations of scrap tires in the U.S. Army were identified via a questionnaire. A scrap tire disposal system was conceived consisting of presently available tire disposal and recycling processes and used in a logical approach to arrive at several most practical process alternatives. Over thirty processes for the disposal of tires and their relationships to each other were investigated. Four process alternatives involving combinations of these processes were recommended for further investigation with respect to the local economic picture and current disposal practices at each Army installation.

Descriptors: \*Tires, \*Polymers, Waste disposal, Plastics, Waste recycling, Shredding, Incinerators, Earth fills, Cryogenics, Pavements, Cost analysis, Military requirements

Identifiers: \*Solid waste disposal, Sanitary landfills, Waste heat recovery, Tire recycling, NTISDCDA

AD-A024 655/3ST NTIS Prices: HC\$6.00/MF\$2.25

Polymer-Concrete Composites for Energy Related Systems. Progress  
Report No. 5, April--June 1975

Brockhaven National Lab., Upton, N.Y. (0936000)  
C6411A2 FLD: 13C, 13B, 08I, 50C, 89G, 48A, 68D ERA0103  
1975 15p  
MONITOR: 18

ABSTRACT: Activities in research programs are reported on polymer--concrete materials for geothermal applications and in applications for solid nonradioactive waste incorporation in useful products.

DESCRIPTORS: (\*Solid wastes, \*Uses), (\*Concrete-plastic composites, \*Mechanical properties), Composite materials, Concretes, Geothermal systems, High temperature, Pipes, Polymers, Pressure dependence, Temperature dependence, Testing, Thermodynamic properties

IDENTIFIERS: ERDA/360601, ERDA/150900, \*Waste recycling, Reclamation, Concrete polymer composites, NTISERDA

BNL-20336 NTIS Prices: PC\$3.50/MF\$2.25

Recovering Polyurethane Foam and Other Plastics from Auto-Shredder Reject

Bureau of Mines, Salt Lake City, Utah. Salt Lake City Metallurgy Research Center.

Rept. of investigations 1975

AUTHOR: Valdez, E. G., Dean, K. C., Bilbrey, J. H. Jr, Mahoney, L. R.  
C6382K4 FLD: 13B, 07C, 13F, 68C, 99C, 91A GRAI7611

Dec 75 17p

REPT NO: BuMines-RI-8091

MONITOR: 18

ABSTRACT: A cooperative study was made by the Federal Bureau of Mines and the Ford Motor Co. to investigate the recovery of polyurethane foam and other assorted plastics from the nonmagnetic rejects from automobile shredders. The material used in the study was produced by the shredding of two 1972 Montegos provided by Ford. The proposed flowsheet, as developed by the Bureau, consisted of a combination of screening, water classification, and gravity separation. All of the foam and between 52 and 80 pct of the assorted plastics were recovered. The reclaimed foam concentrates which contained 63 pct foam were hydrolyzed in laboratory tests to produce a potentially reusable liquid mixture of polyether glycol monomers and toluene diamine.

DESCRIPTORS: \*Plastics, \*Solid waste disposal, \*Automobiles, \*Materials recovery, Scrap, Foam, Polyurethane resins, Shredding, Thermosetting resins, Glycols, Amines, Classifiers, Separation, Size screening

IDENTIFIERS: Junk car disposal, \*Waste recycling, Toluene diamines, NTISDIBM

PB-250 705/1ST NTIS Prices: PC\$3.50/MF\$2.25

Photodegradable Plastics Containing alpha-Halophenyl Ketones

Department of Agriculture, Washington, D.C. (108 800)

Patent

AUTHOR: Freedman, Bernard, Diamond, Martin J.

C6284H3 FLD: 11I, 13B, 90B, 710, 68C GRAI7610

Filed 22 Aug 74, patented 13 Jan 76 4p

REPT NO: PAT-APPL-499 805, PATENT-3 932 338

MONITOR: 18

Government-owned invention available for licensing. Copy of patent available Commissioner of Patents, Washington, D.C. 20231 \$0.50.

ABSTRACT: Polyolefins capable of photodegradation are prepared by incorporating in the polyolefin an additive which contains chlorine, bromine, or iodine in a position alpha to a carbonyl group and which also contains a phenyl group. This invention will help a pollution problem in solid waste disposal.

DESCRIPTORS: \*Patents, \*Olefin resins, \*Synthesis(Chemistry), \*Photodegradation, Additives, Halohydrocarbons, Plastics, Solid waste disposal

IDENTIFIERS: PAT-CL-260-32.8, NTISGPAG

PB-250 403/3ST NTIS Prices: Not available NTIS

Photodegradable Plastic Composition Containing a N-Halo Imide

Department of Agriculture, Washington, D.C. (108 800)

Patent

AUTHOR: Freedman, Bernard, Diamond, Martin J.

C6284H2 FLD: 11I, 13B, 90B, 710, 68C GRAI7610

Filed 22 Mar 74, patented 13 Jan 76 6p

REPT NO: PAT-APPL-453 911, PATENT-3 932 352

MONITOR: 18

Government-owned invention available for licensing. Copy of patent available Commissioner of Patents, Washington, D.C. 20231 \$0.50.

ABSTRACT: Polyolefins capable of photodegradation are prepared by incorporating in the polyolefin an additive which contains chlorine, bromine, or iodine directly linked to the nitrogen atom of an amide or imide group. This would help solve the solid waste disposal problem.

DESCRIPTORS: \*Patents, \*Synthesis(Chemistry), \*Photodegradation, \*Olefin resins, Amides, Environmental impacts, Pollution, Imides, Halogen organic compounds, Plastics, Solid waste disposal

IDENTIFIERS: PAT-CL-260-45.8, NTISGPAG

PB-250 402/5ST NTIS Prices: Not available NTIS

# Degradable Starch-Based Agricultural Mulch Film

Department of Agriculture, Washington, D.C. (108 800)

## Patent Application

AUTHOR: Otey, Felix H., Mark, Arthur M.

C6283F4 FLD: 11I, 13B, 90B\*, 710, 68C GRAI7610

Filed 27 Feb 75 15p\*

REPT NO: PAT-APPL-554 058

MONITOR: 18

Government-owned invention available for licensing. Copy of application available NTIS.

ABSTRACT: Disclosed in this patent application are plastic film compositions for agricultural mulch which will withstand outdoor weathering conditions for a desired time and then rapidly disintegrate. The film composition comprises starch, poly(vinyl alcohol), glycerol, and a water-resistant coating.

DESCRIPTORS: \*Patent applications, \*Polymeric films, \*Biodeterioration, \*Starches, \*Synthesis(Chemistry), Polymers, Vinyl compounds, Plasticizers, Degradation, Plastics, Solid waste disposal, Water proofing, Weathering, Glycerol

IDENTIFIERS: NTISGPAG

PB-250 153/4ST NTIS Prices: PC\$3.50/MF\$2.25

# An Economic Evaluation of Technical Systems for Scrap Tire Recycling

Municipal Environmental Research Lab., Cincinnati, Ohio. Solid and Hazardous Waste Research Div.

Final rept.

AUTHOR: Goddard, Haynes C.

C6095J2 FLD: 13B, 68C\*, 91A\* GRAI7608

Dec 75 48p\*

MONITOR: EPA/600/5-75/019

ABSTRACT: A technological and economic assessment is made of alternative technologies to recover the waste rubber in scrap vehicle tires. The principal technical alternatives evaluated are ground scrap rubber as an asphalt additive, retreading, energy recovery, and carbon black recovery. The greatest potential benefits are seen to occur with retreading and asphalt additives, followed by carbon black and energy recovery.

DESCRIPTORS: \*Materials recovery, \*Tires, \*Solid waste disposal, \*Scrap, Elastomers, Asphalts, Construction materials, Flexible pavements, Economic analysis, Management planning, Reclamation, Carbon black, Incinerators, Heat recovery, Roads

IDENTIFIERS: \*Waste recycling, Secondary materials industry, Scrap disposal, NTISEPAORD

PB-249 197/5ST NTIS Prices: PC\$4.00/MF\$2.25



Consumer Goods: A Thermodynamic Analysis of Packaging, Transport, and Storage

Chicago Univ., Ill. Dept. of Chemistry.\*Illinois Inst. for Environmental Quality, Chicago. (400 334)

Final rept.

AUTHOR: Makino, Hiro, Berry, R. Stephen

C5941C1 FLD: 13D, 10A, 13B, 96B, 97B\*, 68C\*, 94G\* GRAI7606

Jun 73 182p\*

PROJECT: IIEQ-80.012

MONITOR: IIEQ-75-14

ABSTRACT: The analysis of packaging, transportation, storage and marketing of consumer goods shows that packaging requires by far the largest amounts of energy, and that there are no simple ways to replace packaging with much less energy - intensive transport, storage, or marketing procedures. There are clear directions in which savings can be made; the most effective of these are recycling metal cans and other metal containers, using refillable glass containers, and either recycling paper or incinerating paper and plastic to generate heat or power. It was concluded that the overall potential for conserving energy resources for this relatively small industry is about 4.5% of the total national energy budget, even without any major technological development.

DESCRIPTORS: \*Packaging, \*Commodity management, \*Energy consumption, Materials handling, Containerizing, Cargo transportation, Solid waste disposal, Reclamation, Wood, Paperboards, Containers, Plastics, Cans, Glass, Aluminum, Steel, Storage, Economic analysis, Heat recovery

IDENTIFIERS: \*Consumer goods, Waste recycling, Beverage containers, Electric power consumption, NTIS:IIEQ

PB-247 755/2ST NTIS Prices: PC\$7.50/MF\$2.25

Continuous Process for Mechanically Separating Materials Contained in Urban Refuse

Department of the Interior, Washington, D.C. (109 950)

Patent

AUTHOR: Stanczyk, Martin H., Sullivan, Paul M., Spendlove, Max J.

C5733H3 FLD: 13B, 90A\*, 68C, 91A GRAI7603

Filed 9 Mar 73, patented 19 Nov 74 7p\*

REPT NO: PAT-APPL-339 687, PATENT-3 848 813

MONITOR: 18

Also includes report no. DOCKET/MIN-2118.

Government-owned invention available for licensing. Copy of patent available Commissioner of Patents, Washington, D.C. 20231 \$0.50.

ABSTRACT: In the patent urban waste, such as that collected from households in urban areas, is processed in the dry 'as collected' state to recover ferrous metals, nonferrous metals, glass and paper fractions of suitable quality for sale and recycling. Waste is first shredded without balling or crushing tin cans and is thereafter subjected to a series of separations based upon differences in the physical properties of the waste materials.

DESCRIPTORS: \*Solid waste disposal, \*Refuse disposal, \*Materials recovery, \*Patents, Separation, Shredding, Containers, Metal scrap, Paper, Aluminum, Iron alloys, Glass, Plastics, Containers

IDENTIFIERS: \*Waste recycling, Scrap recycling, Secondary materials industry, PAT-CL-241-19, NTISGPINT

PB-246 012/9ST NTIS Prices: Not available NTIS

Base Line Forecasts of Resource Recovery, 1972 to 1990

Midwest Research Inst., Kansas City, Mo.\*Environmental Protection Agency, Washington, D.C. Office of Water Planning and Standards. (230 350)

Final rept.

AUTHOR: Nuss, Gary R., Franklin, William E., Hahlin, David, Park, William, Urie, Michael

C5613C1 FLD: 13B, 68C, 91A\*, 71\* GRAI76C1

Mar 75 386p\*

CONTRACT: EPA-68-01-0793

MONITOR: EPA/530-SW107c

ABSTRACT: An assessment is made of the future of resource recovery from municipal waste for the years 1972 to 1990, based on the assumption there would be no Federal legislation to stimulate resource recovery to 1990. Key methods of recovery are examined with emphasis on large-scale system recovery techniques (primarily energy/material recovery by SMSA). Data on material collection, recycling centers and current scrap dealers are also included. The results are summarized by material for the resources studied: glass, ferrous metals, aluminum, plastics, rubber, paper.

DESCRIPTORS: \*Solid waste disposal, \*Materials recovery, Management planning, Reclamation, Forecasting, Government regulations, Legislation, Economic analysis, Earth fills, Site surveys, Glass, Aluminum, Metal scrap, Iron alloys, Steels, Containers, Plastics, Packaging materials, Tires, Paper, Assessments

IDENTIFIERS: \*Secondary materials industry, \*Waste recycling, Electric power consumption, Waste management, Glass recycling, Metal recycling, Paper recycling, Scrap recycling, NTISEPASW

PB-245 924/6ST NTIS Prices: PC\$10.75/MF\$2.25

## Fuel Gas Production from Solid Waste

Dynatech R/D Co., Cambridge, Mass.\*National Science Foundation,  
Washington, D.C. Research Applied to National Needs. (404 540)

Final rept. 28 Jun 73-31 Dec 74

AUTHOR: Kispert, R. G., Sadek, S. E., Anderson, L. C., Wise, D. L.

C5391L4 FLD: 21D, 13B, 97H, 68C GRAI7524

31 Jan 75 167p

REPT NO: Dynatech-1258

GRANT: NSF-C827

MONITOR: NSF/RA/N-74/268

See also PB-238 563.

ABSTRACT: Six major program tasks are discussed: (1) Preliminary engineering analysis and economic evaluation of a full-scale fuel gas from solid waste facility; (2) Pilot plant design, procurement, and initial operation; (3) Supporting laboratory experiments and studies at the University of Massachusetts and M.I.T.; (4) Confirmation of the economic model for the full-scale fuel gas from solid waste facility; (5) Evaluation and specification of a proof-of-concept pilot plant; (6) Application of the computer model to full-scale plant studies.

DESCRIPTORS: \*Fuels, \*Energy sources, \*Manufactured gas, \*Reclamation, \*Solid waste disposal, Garbage, Anaerobic processes, Pilot plants, Design, Drawings, Cost analysis, Production rate, Materials recovery, Aluminum, Glass, Plastics, Regional planning, Fuel gas, Economic models, Computerized simulation

IDENTIFIERS: Solid wastes, Geographic locations, Refuse disposal, Waste recycling, NTISNSFRA

PB-245 083/1ST NTIS Prices: PC\$6.25/MF\$2.25

Energy Conservation Study. Report to Congress

Federal Energy Administration, Washington, D.C. Office of Energy Conservation and Environment.

C5102K2 FLD: 10A, 05D, 97G GRAI7520

Dec 74 181p

REPT NO: FEA/D-74/231

MONITOR: 18

ABSTRACT: This report discusses (1) the energy conservation potential of restricting exports of fuels or energy-intensive products or goods, including an analysis of balance-of-payments and foreign relations implications of any such restrictions; (2) alternative requirements, incentives, or disincentives for increasing industrial recycling and resource recovery in order to reduce energy demand, including the economic costs and fuel consumption tradeoff which may be associated with such recycling and resource recovery in lieu of transportation and use of virgin materials; and (3) means of incentives or disincentives to increase efficiency of industrial use of energy.

DESCRIPTORS: \*Energy conservation, \*International trade, Fuel consumption, Crude oil, Jet engine fuels, Liquefied petroleum gases, Kerosene, Distillates, Residual oils, Natural gas, Coal, Industries, Food industry, Paper industry, Chemical industry, Metal industry, Glass industry, Petroleum industry, Balance of payments, Foreign policy, Materials recovery, Utilization, Steels, Aluminum, Ingots, Glass, Papers, Plastics, Incentives, Constraints

IDENTIFIERS: Waste recycling, Secondary materials industry, NTISEXFEA

PB-243 369/6ST NTIS Prices: PC\$7.00/MF\$2.25

Environmental Assessment of Future Disposal Methods for Plastics in  
Municipal Solid Waste

Battelle Columbus Labs., Ohio.\*National Environmental Research Center,  
Cincinnati, Ohio. (407 080)

Final rept.

AUTHOR: Vaughan, D. A., Ifeadi, C., Markle, R. A., Krause, H. H.

C5053H3 FLD: 13B, 11I, 68C\*, 710, 91A\* GRAI7519

Jun 75 86p\*

GRANT: EPA-R-803111

PROJECT: EPA-ROAP-21BFS-017

MONITOR: EPA/670/2-75-058

ABSTRACT: Production of plastics for engineering and consumer items in the United States has been predicted to reach 113 million tons per year by the year 2000. This figure does not include the production of polymer used for synthetic fiber or fabric. From 31 to 38 million tons of the plastic produced is expected to reach the solid waste stream, depending on the basis of estimation. The largest amount will go to sanitary landfills, and the next largest amount will be thermally treated using such methods as power generation, incineration, and pyrolysis. Small amounts of plastic are expected to be disposed of in open dumps or as litter. Resource recovery for plastics in municipal refuse up to the year 2000 is expected to be insignificant. Air pollution as a result of plastics in the landfills and open dumps will be negligible, even if there is still some burning of open dumps in 2000.

DESCRIPTORS: \*Environmental impacts, \*Plastics, \*Refuse disposal, \*Solid waste disposal, Forecasting, Trends, Assessments, Earthfills, Materials recovery, Leaching, Air pollution, Water pollution, Combustion products

IDENTIFIERS: \*Plastics recycling, Sanitary landfills, Waste recycling, Incineration, NTISEPAORD

PB-243 366/2ST NTIS Prices: PC\$4.75/MF\$2.25

Promoting the Utilization of Solid Waste Glass-Polymer Composite Technology in the Public and Private Sectors

Brookhaven National Lab., Upton, N.Y.\*National Science Foundation, Washington, D.C. Office of Experimental Research and Development Incentives.\*Associated Universities, Inc., New York. (064 750)

Final rept.

AUTHOR: Manowitz, B., Kukacka, L. E., Small, M. M., Steinberg, M.

C4973H4 FLD: 13B, 13C, 70E, 68C, 91A, 50C GRAI7518

Oct 74 134p

GRANT: NSF/AG-522

MONITOR: NSF/RA/R-74-056

Prepared in cooperation with Associated Universities, Inc., New York.

ABSTRACT: This report was part of a larger effort to explore how best to transfer technology which had originated in Federal Laboratories to the civilian/commercial sector. In this report, Brookhaven discusses the actions undertaken to transfer its Glass-Polymer Composite sewer pipe technology to several local governments in the Eastern United States. Problems which were encountered and their attempted solutions are described, and recommendations for certain policy actions by the federal government are identified.

DESCRIPTORS: \*Composite materials, \*Sewer pipes, \*Technology transfer, Scientific research, Solid waste disposal, Glass, Concrete, Polymers, Research management, Marketing, Government policies, National government, State government, Product development, Reclamation

IDENTIFIERS: \*Glass recycling, \*Polymer concretes, Waste recycling, NTISNSFRA, NTISAEC

PB-242 183/2ST NTIS Prices: PC\$5.75/MF\$2.25

Design Considerations for a Pilot Process for Separating Municipal Refuse

Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.\*National Environmental Research Center, Cincinnati, Ohio.  
(220 022)

Final rept.

AUTHOR: Wilson, David Gordon, Senturia, Stephen David

C4855C2 FLD: 13B, 68C, 91A GRAI7516

May 75 88p

GRANT: EPA-R-800786

PROJECT: EPA-ROAP-24AIN-06

MONITOR: EPA/670/2-75-040

ABSTRACT: Separating municipal solid waste into its valuable and recycleable elemental components is examined here in terms of various mechanical engineering schemes and processes that might best accomplish this task. Although past efforts have concentrated on first reducing the particle size by shredding, this investigation considered the advantages of whole-item coding and sorting without the expensive shredding operation. The result was an interesting base technology for a proposed pilot plant design that could potentially redirect future resource recovery efforts in solid waste.

DESCRIPTORS: \*Solid waste disposal, \*Refuse disposal, \*Materials recovery, \*Separators, Reclamation, Detectors, Infrared detectors, Size screening, Metal scrap, Glass, Wood, Aluminum, Steel, Plastics, Paper, Classifiers, Materials handling

IDENTIFIERS: Waste recycling, \*Sorting, Metal recycling, Paper recycling, Glass recycling, NTISEPAORD

PB-242 136/0ST NTIS Prices: PC\$4.75/MF\$2.25



Requiring Secondary Materials in Federal Construction - A Feasibility Study

Resource Planning Associates, Cambridge, Mass.\*Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management.

Final rept.

AUTHOR: Ramsey, James M.

C4732L2 FLD: 13B, 13C, 68C\*, 91A\*, 50C\*, 89G\* GRAI7514

Jan 75 202p\*

REPT NO: RA-74-20

CONTRACT: EPA-68-01-2272

MONITOR: EPA/530/SW-130c

ABSTRACT: The Federal Government is the largest single purchaser of construction in the United States. The study examines the feasibility of the Government's using this considerable purchasing power to require the use of secondary materials in construction products as a means of increasing recycling. The analysis of Federal construction procurement policies, laws, regulations, and funding levels shows that while the Government is a major purchaser of construction materials, there are significant constraints to requiring recycled materials in these products. An in-depth technical and economic analysis of opportunities to use secondary materials recovered from the municipal solid waste stream shows that Federal construction procurement could impact significantly on the materials in the municipal solid waste stream.

DESCRIPTORS: \*Solid waste disposal, \*Government policies, \*Reclamation, \*Construction materials, Iron and steel industry, Glass, Plastics, Paper, Legislation, Regulations, Government procurement, Metal scrap, Specifications, Economic analysis, Feasibility

IDENTIFIERS: \*Secondary materials industry, Waste recycling, Glass recycling, Paper recycling, Metal recycling, NTISEPASW

PB-241 729/3ST NTIS Prices: PC\$7.25/MF\$2.25

An Evaluation of the Impact of Discriminatory Taxation on the Use of  
Primary and Secondary Raw Materials

Booz-Allen and Hamilton, Inc., Washington, D.C.\*Environmental  
Protection Agency, Washington, D.C. Office of Solid Waste Management.

Final rept.

C4723L3 FLD: 08I, 94H, 13B, 48A\*, 71\*, 68C\*, 96A\* GRAI7514

1975 170p\*

CONTRACT: EPA-68-01-0792

MONITOR: EPA/530/SW-101c

ABSTRACT: This report attempts to describe and quantify the value of current Federal tax policy as it relates to competition between virgin and secondary materials. Tax incentives are quantified on a per ton basis both at the raw material and selected final product stages. A qualitative review of the potential impact of removing virgin material incentives on the use of secondary materials is provided. Seven materials are included (bauxite, timber, sand, iron ore, coal, oil, natural gas) with an analysis of how their taxes impact on several product categories (glass, steel, aluminum, newsprint, paperboard, plastics and rubber). The tax benefits examined include the depletion allowance, capital gains, exploration and development expenditures, State and local taxes and foreign taxes.

DESCRIPTORS: \*Industries, \*Taxes, \*Raw materials, Solid waste disposal, Reclamation, Aluminum industry, Paper industry, Glass industry, Iron and steel industry, Plastics, Rubber industry, Government policies, Bauxite, Structural timber, Sands, Iron ores, Coal, Petroleum, Natural gas, Federal government, State government, Local government, Cost estimates

IDENTIFIERS: \*Secondary materials industry, \*Waste recycling,  
NTISEPASW

PB-240 988/6ST NTIS Prices: PC\$6.25/MF\$2.25

# Application of Thermally Sensitive Binders as an Ordnance Disposal Method

Stanford Research Inst Menlo Park Calif\*Naval Sea Systems Command,  
Washington, D.C. (332500)

Progress rept. no. 6 (Final), 26 Jan-24 Jul 74

AUTHOR: Ross, Donald L., Hendry, Dale G., Manser, Gerald E., Gould, Constance

C4692L3 FLD: 19A, 7C, 79A, 99D GRAI7514

31 Jul 74 33p

REPT NO: SRI-2426-6-F

CONTRACT: N00017-73-C-4329

PROJECT: SRI-PYU-2426-11

MONITOR: 18

ABSTRACT: The objective of the program is to develop experimental plastic bonded explosives (PBXs) that will undergo controlled thermal degradation to give a processable material that can be removed easily from explosive casings and is therefore more readily disposable or recyclable. To achieve this objective the authors have continued development of azo-containing thermally degradable polyurethanes, which currently show the most promise as candidate binders. The authors also investigated thermally degradable carbonate- and amine oxide-containing polymers for potential use in thermally degradable PBXs in the same way that the azo-containing binder is being developed. During this contract the best candidate heat sensitive binder developed during previous work for NSSC was used to prepare an HMX-loaded PBX. The results indicate that the heat-sensitive binder approach should provide a practical means of facilitating future disposal and recycle of ordnance. Other heat sensitive groups were also prepared and tested to achieve binder decomposition at lower temperatures and shorter times than the binder described above. 1-Azobis-1-(p-hydroxyphenyl)ethane (PHPA) was incorporated into a linear polyurethane and the resultant polymer tested for its degradation characteristics.

DESCRIPTORS: \*Plastic bonded explosives, \*Decomposition, \*Binders, Isocyanate plastics, Waste disposal, Solid wastes, Reaction kinetics, HMX

IDENTIFIERS: \*Solid waste disposal, AZO compounds, NTISDODN

AD-A009 436/7ST NTIS Prices: PC\$3.75/MF\$2.25

## Industrial Solid Waste Classification Systems

Little (Arthur D.), Inc. Cambridge, Mass.\*National Environmental Research Center, Cincinnati, Ohio. Solid and Hazardous Waste Research Lab. (208 850)

Final rept.

AUTHOR: Berkowitz, J. B., March, F., Horne, E.

C4585D1 FLD: 13B, 07A, 68C\*, 99B\*, 94\* GRAI7512

Jan 75 413p\*

CONTRACT: EPA-68-03-0123

PROJECT: EPA-ROAP-24ALH-C06

MONITOR: EPA/670/2-75-024

ABSTRACT: A classification system for industrial processing wastes was developed based on waste stream characteristics, materials components, and chemical composition. An associated inventory form was devised for systematic reporting of a variety of waste descriptors including physical form, composition, methods of handling, treatment and disposal, and potential for reuse. The system was developed by literature review, consultations, and site visits. It is intended for application to industrial waste surveys and to the preparation of statistical summaries of parameters pertinent to solid waste management. The system is adaptable to computer storage and retrieval of information related to reuse potential and disposability of industrial wastes. It is designed to cover all industries of the SIC codes, and has been tested on a broad representation of processing waste streams in a large number of industries.

DESCRIPTORS: \*Solid waste disposal, \*Industrial wastes, \*Hazardous materials, \*Classification, Pollution, Surveys, Metal industry, Food industry, Agricultural wastes, Paper industry, Plastics industry, Textile industry, Mining, Animal products, Chemical industry, Leather industry, Drug industry, Detergents, Petroleum industry, Sludge disposal, Byproducts, Data retrieval, Inventories, Management planning, Plant location, Transportation, Materials recovery, Site surveys

IDENTIFIERS: Waste recycling, Wood processing industry, Mine wastes, Liquid waste disposal, Brewing industry, NTISEPAERC

PB-239 119/1ST NTIS Prices: PC\$10.50/MF\$2.25

Recovery and Reuse of Wastepaper from Shredded Household Trash

Forest Products Lab Madison Wis (141700)

Forest Service research paper

AUTHOR: Laundrie, James F.

C4544F3 FLD: 13B, 11L, 68C, 71R GRAI7512

1975 14p

REPT NO: FSRP-FPL-252

MONITOR: 18

ABSTRACT: The report describes the research and development of the dry process originated at the Forest Products Laboratory for separating wastepaper from shredded household trash. The process, based on air classification, provides for removal of thermoplastic films. It also permits separation of the wastepaper by grade. Indications are that the recovered paper can be used successfully in a variety of products.

DESCRIPTORS: \*Waste disposal, \*Reclamation, \*Paper, Separation, Thermoplastic resins, Films

IDENTIFIERS: Waste recycling, Waste papers, \*Refuse disposal, Recycled paper, Shredding, Classifiers, Sorting, NTISDODFPL

AD-AC07 918/6ST NTIS Prices: PC\$3.25/MF\$2.25

## Disposability Characteristics of Military Packaging Materials

Booz-Allen and Hamilton Inc Bethesda Md\*Army Natick Labs., Mass. Food Engineering Lab.\*Snell (Foster D.), Inc., Cleveland, Ohio. (408597)

Final rept. Feb-Dec 73

AUTHOR: Yurasits, Stephen J., Behari, Kunj, MacArthur, Duncan P.

C4264I2 FLD: 13B, 15E, 13D, 68C\*, 74E USGRDR7508

6 Mar 74 435p

CONTRACT: DAAG17-73-C-0102

PROJECT: DA-1-T-762713-D-552

TASK: 1-T-762713-D-55210

MONITOR: FEL-1

Prepared in cooperation with Snell (Foster D.), Inc., Cleveland, Ohio.

**ABSTRACT:** This study was conducted to determine the best disposal methods to be used for individual military packaging materials. The results of the detailed paper analysis were described on an individual summary Fact Sheet for each of the 104 military packaging materials considered. The Fact Sheets were prepared to be useful references for military installations and to offer guidance in the selection of environmentally and economically sound treatment and reclamation or disposal processes. This analysis approach employed the following basic steps: A list of 104 materials was prepared in close coordination with Natick Laboratories. The material categories included chemicals, (lubricants, cleaning fluids and preservatives) glasses, metals, papers, plastics, textiles, and woods; The disposability characteristics of packaging materials were defined for each available process; The alternative processes available for the disposal of packaging materials were reviewed. The possible disposal alternatives included reuse, recycling, pyrolysis, composting, baling, incineration, sanitary landfill, sea disposal, and subjecting to microbial treatment.

**DESCRIPTORS:** \*Waste disposal, \*packaging, \*Military requirements, Systems analysis, Tables(Data), Solid wastes, Bibliographies, Glass, Metals, Paper, Plastics, Textiles, Chemicals, Economics, Ecology, Incinerators, Earth fills, Sanitary engineering, Air pollution, Oceans, Cleaning compounds, Preservatives, Lubricants, Pollution, Reclamation, Biodeterioration

**IDENTIFIERS:** Ocean waste disposal, waste recycling, Sanitary landfills, NTISDODA

AD/A-005 168/OST NTIS Prices: PC\$11.25/MF\$2.25

An Analysis of the Current Impact of Plastic Refuse Disposal Upon the Environment

Battelle Columbus Labs., Ohio.\*National Environmental Research Center, Cincinnati, Ohio. Solid and Hazardous Waste Research Lab. (407 080)

AUTHOR: Vaughan, D. A., Anastas, M. Y., Krause, H. H.

C4234K3 FLD: 11I, 13B, 68C\*, 710\* USGRDR7507

Dec 74 57p\*

GRANT: EPA-R-800055

PROJECT: EPA-ROAP-24ALL-19

MONITOR: EPA/670/2-74-083

ABSTRACT: In view of the 7-fold growth in the amount of plastic waste over the past 20 years the impact of plastic refuse disposal upon the environment has been evaluated on the basis of the major current methods of disposal, municipal incineration, landfill and litter. While weight percentage of the plastic component may tend to be used to evaluate its contribution to the environmental impact via incineration, the volume percentage of plastics is more important with respect to its contribution to landfill, both sanitary and open dump with and without burning. A useful life analysis of plastic products is described which quantifies the amounts of plastic waste by type.

DESCRIPTORS: \*Solid waste disposal, \*Plastics, Incinerators, Earth fills, Refuse disposal, Air pollution, Water pollution, Urban planning, Ecology

IDENTIFIERS: Environmental effects, NTISEPAERC

PB-238 654/8ST NTIS Prices: PC\$4.25/MF\$2.25

An Investigation of the Effects of Society and the Environment of  
Alternative Methods of Food and Beverage Packaging

Illinois Univ., Urbana. School of Engineering.\*National Science  
Foundation, Washington, D.C. Student-Originated Studies Program.

Final rept. Jan-Dec 71

AUTHOR: Frederick, Richard, Jurich, Dale, Boggess, W. R., Pfeffer, J.  
T.

C4233A2 FLD: 13D, 06H, 13B, 98H, 68C USGRDR7507

Jan 72 223p

GRANT: NSF-GY-9164

MONITOR: NSF-SOS-GY-9164

ABSTRACT: This report deals with the study of food and beverage packaging alternatives available to the household. A general systems analysis type methodology for studying packaging systems, or general environmental/social systems, is outlined. The evaluative factors considered in the methodology are: (1) energy usage; (2) materials usage; (3) pollution generated; (4) consumer preference; (5) public health and safety; (6) economic considerations. Four specific food and beverage products: fresh meats, milk, soft drinks, and processed vegetables, are involved in the study. The methods and results from two questionnaires that represent a state-wide survey are presented. The questionnaires deal with: (1) consumer preferences for alternative packages associated with the above mentioned products; (2) the ecological awareness of the consumer, and his willingness to accept ecologically sound alternatives. The public health and safety, pollution and economic aspects of packaging are discussed on the qualitative level for the above products and associated packaging systems.

DESCRIPTORS: \*Solid waste management, \*Food packaging, \*Containers, \*Materials handling, Beverages, Systems analysis, Solid waste disposal, Paper, Glass, Aluminum, Cans, Bottles, Plastics, Collection, Pollution, Questionnaires, Consumers, Public health, Metals, Cost estimates, Economics, Consumer preferences, Energy consumption, Air pollution, Water pollution

IDENTIFIERS: \*Beverage containers, NTISNSF

PB-238 286/9ST NTIS Prices: PC\$7.25/MF\$2.25



# Bibliography on Recycling of Container Materials. First Supplement

British Steel Corp., Sheffield (England). Information Services.

AUTHOR: Sloan, J.

C4172H2 FLD: 13H, 94A\*, 68C USGRDR7506

Dec 74 20p\*

REPT NO: SM/BIB/902/Suppl/1

MONITOR: 18

ABSTRACT: Eighty annotated references are given in this supplement, divided as follows: (1) Can recycling, (2) packaging and pollution, (3) solid waste, reclamation and disposal, (4) announcements, recycling and environmental legislation. An author/company index is provided.

DESCRIPTORS: \*Bibliographies, \*Materials recovery, \*Containers, \*Solid waste disposal, Metal cans, Bottles, Paper products, Plastics, Recycled waste products, Packaging, Legislation, Economic potential, Environmental issues, Great Britain

IDENTIFIERS: \*Waste recycling, \*Beverage containers, Detinning, NTISGBISRA

PB-238 802/3ST NTIS Prices: PC\$3.25/MF\$2.25

Current Industrial Reports. Plastics Bottles. January 1974

Bureau of the Census, Washington, D.C. (069 350)

Monthly rept.

C4153E1 FLD: 05C, 13D, 86I USGRDR7506

Mar 74 3p

REPT NO: M30E(74)-1

MONITOR: 18

Paper copy available from Social and Economic Statistics Administration, Washington, D.C. 20233. \$1.50/year, \$0.15/copy.

ABSTRACT: Quantity of shipments, production, and stocks (end of month) are shown by type of container for the current and preceding month, with comparative figures for the current month a year ago. A summary is included, showing quantity of shipments, production, and stocks (end of month), by type of container for the current month and monthly for the past 2 years.

DESCRIPTORS: \*plastic bottles, \*Industry statistics, Shipments, Production statistics, Utilization, Inventories, Classifications

IDENTIFIERS: Blow molded bottles, Current industrial reports, Monthly summaries, NTISCOMCEN

COM-74-70620/1ST NTIS Prices: Not available NTIS

# Solubilization and Spore Recovery from Silicone Polymers

North Dakota State Univ., Fargo. Dept. of Polymers and Coatings.

Ph.D. Thesis.

AUTHOR: Hsiao, Y. C.

C4114L4 FLD: 07C, 99C, 57K STAR1302

Jun 74 145p

REPT NO: NASA-CR-140769

CONTRACT: NGR-35-001-012

MONITOR: 18

**ABSTRACT:** A non-sporicidal technique for solvent degradation of cured silicone polymers was developed which involves chemical degradation of cured silicone polymers by amine solvents at room temperature. Substantial improvements were obtained in the recovery of seeded spores from room temperature cured polymers as compared to the standard recovery procedures, which indicates that the curing process is not sufficiently exothermic to reduce spore viability. The dissolution reaction of cured silicone polymers with amine solvents is proposed to occur by bimolecular nucleophilic displacement. The chemical structure of silicone polymers was determined by spectroscopic methods. The phenyl to methyl ratio, R/Si ratio, molecular weight, and hydroxyl content of the silicone resins were determined. (Author)

**DESCRIPTORS:** \*Polymer chemistry, \*Reclamation, \*Silicone resins, \*solvents, \*Spores, Amines, Chemical attack, Curing, Degradation, Dissolving, Exothermic reactions, Hydroxyl compounds, Room temperature, Spectroscopic analysis

**IDENTIFIERS:** NTISNASA

• N75-11591/5ST NTIS Prices: PC\$5.75/MF\$2.25

# Recycling of Plastics from Urban and Industrial Refuse

Bureau of Mines, Rolla, Mo. Rolla Metallurgy Research Center.

Rept. of investigations

AUTHOR: Holman, J. L., Stephenson, J. B., Adam, M. J.

C3994H2 FLD: 11I, 13B, 68C, 710 USGRDR7503

Oct 74 50p

REPT NO: BuMines-RI-7955

MONITOR: 18

ABSTRACT: The report describes methods for separating and reusing major portions of waste plastics discarded in urban and industrial refuse. Waste plastic concentrates from a local collection drive, recycling center collections, urban refuse pilot plant processors, and the secondary metals industry were separated into three major thermo-plastic families-polyolefins, styrenes, and vinyls-based on differences in density using a Bureau-designed sink-float-elutriation hydraulic separator. Other separation methods and systems such as air classification, jigging, liquid media, screening, and electrostatics were studied. Vinyl plastics contain up to 50 pct HCl. It was found that over 90 pct of the HCl in vinyls can be recovered as usable hydrochloric acid by pyrolysis at 350C. The remaining pyrolysis products contained heat contents in excess of 12,000 BTU/lb. A characterization study conducted on eight chopped wire insulation wastes from secondary copper and aluminum processors showed that most wastes contained 2 to 7 pct residual metal and large percentages of vinyl. Reclaimed thermo-plastics were fabricated into many useful products.

DESCRIPTORS: \*Plastics, \*Solid waste disposal, \*Reclamation, Utilization, Separation, Electrostatic precipitation, Selection, Metal scrap, Electrical insulation, Olefin resins, Pyrolysis, Polystyrene, Vinyl resins, Classifiers, Hydrochloric acid, Collection, Fabrication, Molding, Extrusion

IDENTIFIERS: \*Waste recycling, Secondary materials industry, Plastics recycling, NTISDIBM

PB-237 837/OST NTIS Prices: PC\$3.75/MF\$2.25

A Study of Pneumatic Solid Waste Collection Systems. As Employed in Hospitals

Ross Hofman Associates, Coral Gables, Fla.\*Environmental Protection Agency, Washington, D.C. Office of Solid Waste Management.

Final rept.

C3924D2 FLD: 13B, 6L, 68C\*, 95G\* USGRDR7502

1974 280p\*

CONTRACT: EPA-68-03-0300

MONITOR: EPA/530/SW-75c

ABSTRACT: This report summarizes a study that assesses the technical and economic feasibility of pneumatically transporting hospital solid waste. Three hospitals employing pneumatic collection systems were surveyed. Variations in systems design and utilization were investigated and reported upon. Cost information was accumulated and analyzed for each hospital. Operational, performance and environmental analyses were performed for all systems involved. This report should be helpful to hospitals already employing pneumatic systems from the standpoint of optimizing operating procedures and should be further helpful for new installations from a design standpoint.

DESCRIPTORS: \*Refuse disposal, \*Collecting methods, \*Solid waste disposal, \*Hospitals, Management methods, Plastics, Manpower utilization, Containers, Automation, Transport equipment, Classifications, Loading procedures, Pneumatic equipment, Compacting, Sanitary landfills, Statistical data, Materials recovery, Infectious diseases, Hazardous materials

IDENTIFIERS: NTISEPASW

PB-236 543/5SL NTIS Prices: PC\$8.75/MF\$2.25

Solid Waste Management, Foreign Research and Development

Army Foreign Science and Technology Center Charlottesville Va (038300)

AUTHOR: Torian, Richard L.

C3881H3 FLD: 13B, 7A, 99B, 68C USGRDR7502

Nov 74 65p

REPT NO: FSTC-CW-03-101-75

PROJECT: FSTC-4203119SH

MONITOR: 18

Trans. of unidentified Russian language article.

ABSTRACT: Developments in countries other than the United States in solid waste management during the period January 1970 to August 1974 are presented. Management and disposal methods considered in this report include biodegradation, recovery, reuse, photodegradation, incineration, adsorption, oxidation, and separation. Materials considered encompass plastics, tires, cellulose, explosives, oils, hazardous chemicals, batteries, photographic waste, cyanides, and bulk waste.

DESCRIPTORS: \*Solid wastes, \*Waste disposal, Biodeterioration, Incinerators, Adsorption, Oxidation, Plastics, Tires, Cellulose, Chemicals, Photography, Storage batteries, Cyanides, Translations, USSR

IDENTIFIERS: Materials recovery, Waste recycling, Hazardous materials, Industrial wastes, NTISDODA

AD/A-000 803/7SL NTIS Prices: PC\$4.25/MF\$2.25

Disposal of Waste Plastic and Recovery of Valuable Products Therefrom  
Environmental Protection Agency, Washington, D.C. (390 139)

Patent

AUTHOR: Banks, Michael E., Lusk, Walter D., Ottinger, Robert S.  
C3795G3      PLD: 7A, 13B, 90B, 68C      USGRDR7426

Filed 21 Jun 71, patented 13 Aug 74      11p

REPT NO: PAT-APPL-154 861, PATENT-3 829 558

MONITOR: 18

Government-owned invention available for licensing. Copy of patent  
available Commissioner of Patents, Washington, D.C. 20231 \$0.50.

ABSTRACT: The patent describes a method of disposing of waste plastic without polluting the environment. It involves passing the plastic to a reactor, heating the plastic in the presence of a gas to at least the decomposition temperature of the plastic, and recovering decomposition products therefrom. The preferred embodiment uses a heated inert carrier gas as the source of heat. The process is especially useful for disposal of polyethylene, polystyrene, and polyvinyl chloride.

DESCRIPTORS: \*patents, \*Solid waste disposal, \*Plastics, \*Pyrolysis, \*Materials recovery, Gas flow, Decomposition reactions, Polyvinyl chloride, Polyethylene, Polystyrene, Hydrocarbons, Styrene, Hydrogen chloride

IDENTIFIERS: PAT-CL-423-481, NTISGPEPA

PB-236 535/1SL      NTIS Prices: Not available NTIS

# Quantitation of Buried Contamination by Use of Solvents

North Dakota State Univ., Fargo. Dept. of Polymers and Coatings.

Semiannual Progress Report, Jan. - Jun. 1974.

AUTHOR: Pappas, S. P., Hsiao, Y. C., Hill, L. W.

C3633C3 FLD: 7C, 99A, 71H STAR1219

Jun 74 9p

REPT NO: NASA-CR-139381

CONTRACT: NGR-35-001-012

MONITOR: 18

ABSTRACT: Experiments directed at determining the potential of reclaimed silicone polymers for reuse are described. (Author)

DESCRIPTORS: \*Contamination, \*Materials recovery, \*Quantitative analysis, \*Silicon polymers, \*Solvent extraction, Crosslinking, Reclamation, Silicone resins, Silicone rubber, Solvent extraction

IDENTIFIERS: NTISNASA

N74-29477/8SL NTIS Prices: PC\$4.00/MF\$2.25



Industrial Hygiene and Air Pollution Evaluation of Pacer Foam  
Operations

Environmental Health Lab McClellan AFB Calif (407609)

Final rept.

AUTHOR: Gokelman, John J.

C3523A2 FLD: 6J, 6F, 57U, 68G, 68A USGRDR7423

May 73 29p

REPT NO: EHL-M-73M-5

PROJECT: EHL-M-AAF-229

MONITOR: 18

ABSTRACT: The report presents the results of the evaluation of several polyurethane foam-in-place facilities for both industrial hygiene and air pollution potential. Three types of units were examined, one fixed large item packaging unit and two small hand packaging kits. Additionally, the report discusses the problems associated with disposing of waste material from the foaming operation. (Author)

DESCRIPTORS: \*Industrial hygiene, \*Air pollution, \*Polyurethane resins, Environments, Foam, Waste disposal, Chemical analysis, Packing materials, Hazards

IDENTIFIERS: Air sampling, Recommendations, Evaluation, Indoor air pollution, NTISDODAF

AD-784 840/1 NTIS Prices: PC\$3.25/MF\$2.25

# Effect of Increasing Plastics Content on Recycling of Automobiles

Bureau of Mines, Washington, D.C. (068 450)

Technical progress rept.

AUTHOR: Dean, K. C., Sterner, J. W., Valdez, E. G.

C3285K3 FLD: 13B, 68C USGRDR7419

May 74 18p

REPT NO: BuMines-TPR-79

MONITOR: 18

Prepared by Salt Lake City Metallurgy Research Center, Utah.

ABSTRACT: Changes in the types of materials used for the construction of recent automobile models has occasioned a review of the continued applicability of current recycling techniques. Plastics are being used increasingly in late model cars. To evaluate the changes occurring, a 1972 Mercury Montego, furnished by the Ford Motor Co., was completely dismantled and analyzed, and the composition compared with that of a composite automobile from 15 vehicles ranging in date of manufacture from 1954 to 1965. The composite vehicle was designated as a circa 1960 model and contained about 26 pounds of plastics while the 1972 model contained over four times that quantity. The increasing use of plastics in automobiles suggests that research to improve the economic potentiality of plastics recycling is warranted.

DESCRIPTORS: \*Plastics, \*Solid waste disposal, \*Automobiles, \*Materials recovery, \*Metal scrap, Cost analysis, Market value, Polyurethane resins, Cellular plastics, Aluminum, Shredding

IDENTIFIERS: \*Waste recycling, \*Junk car disposal, NTISDIBM

PB-234 055/2 NTIS Prices: PC\$3.00/MF\$1.45

Transportation Rates and Costs for Selected Virgin and Secondary  
Commodities

Moshman Associates, Inc., Bethesda, Md.

Final rept.

AUTHOR: Abraham, David G., Saunders, William B., Woodall, Thomas G.

C3221J2 FLD: 5C, 96\*, 68C\*, 85B\* USGRDR7418

1974 254p\*

CONTRACT: EPA-68-01-0790

MONITOR: EPA-SW-530-59c

ABSTRACT: The report summarizes a study that compared the transportation rates for competing secondary (scrap) and virgin materials in five industries: iron and steel, glass, paperboard, rubber, and aluminum products. The three major points researched in the study are: Whether rates are reasonable for each commodity; whether carriers discriminate against secondary materials in ratemaking to the benefit of the respective competing virgin materials; and the magnitude of the effect of transportation charges on commodity prices.

DESCRIPTORS: \*Transportation costs, \*Commodity management, Comparative studies, Scrap, Iron, Steels, Waste paper, Glass, Aluminum, Elastomers, Policies, Discrimination, Metal scrap

IDENTIFIERS: \*Secondary materials industry, Reclaimed rubber, Equitability, NTISEPASW

PB-233 871/3 NTIS Prices: PC\$6.50/MF\$1.45

System Energy and Recycling: A Study of the Beverage Industry  
Illinois Univ., Urbana. Center for Advanced Computation. (407 227)

Special rept.

AUTHOR: Hannon, Bruce

C3143K2 FLD: 13B, 68C, 97G USGRDR7417

17 Mar 73 44p

REPT NO: CAC-23

MONITOR: NSF-RA/N-73-030

Revision of report dated 5 Jan 72. Supersedes PB-229 183.

ABSTRACT: An energy analysis has been performed on the soft drink, beer and milk container systems. The study shows that the energy required to deliver a unit of beverage to the consumer is about three times more in throwaway glass containers than in returnable bottles or bimetallic cans. The energy cost of recycling glass (collecting, separating and remelting) is greater than the comparable cost of mining materials for new bottles. All aluminum cans are about 38% more energy intensive than bimetallic cans. The retail dollar purchase is about 30 percent more for soft drink throwaways, and slightly higher if litter and solid waste disposal costs are added. To complete this study it was necessary to examine the metal, paper, glass and plastics industries in considerable detail. A summary of the energy ratios derived in this report is given. (Modified author abstract)

DESCRIPTORS: \*Solid waste disposal, \*Containers, \*Reclamation, \*Energy consumption, Cans, Bottles, Glass, Metals, Plastics, Economics, Aluminum, Collection, Hauling

IDENTIFIERS: \*Beverage containers, Waste recycling, NTISNSFRA

PB-233 183/3 NTIS Prices: PC\$5.25/MF\$1.45

# The Chemical Conversion of Solid Wastes to Useful Products

Oregon State Univ., Corvallis. Dept. of Agricultural Chemistry. (406 810)

Environmental protection technology series

AUTHOR: Barbour, James F., Groner, Robert R., Freed, Virgil H.  
C3143J3 FLD: 13B, 7A, 2A, 99B\*, 98A\*, 68C\* USGRDR/417

Apr 74 177p\*

GRANT: EPA-R-00242

PROJECT: EPA-ROAP-21BFS-14

MONITOR: EPA-670/2-74-027

ABSTRACT: The use of solid wastes as raw materials for the production of useful products depends primarily on the successful application of chemical and engineering technology to waste disposal problems. The objectives of this study were to: (1) identify the chemical nature of the constituent of solid wastes, (2) investigate transformation process, and (3) conduct engineering and economic evaluation of pilot plant operations. The results of this study will be useful in the development of a solid waste chemical transformation facility, which will be capable of recovering waste generated from municipal, commercial, and agricultural sources for reutilization processes. This report was designed to provide the impetus for continued studies on reutilization processes rather than the culmination of a research effort.

DESCRIPTORS: \*Solid waste disposal, \*Agricultural wastes, \*Reclamation, \*Materials recovery, Refuse, Chemical engineering, Plastics, Crosslinking, Acetylation, Etherification, Straw, Pulping, Hydrogenation, Pilot plants, Economic analysis, Cost estimates

IDENTIFIERS: NTISEPAORM

PB-233 178/3 NTIS prices: PC\$5.50/MF\$1.45

# An Oil Recovery System Utilizing Polyurethane Foam. A Feasibility Study

Edison Water Quality Research Lab.

Environmental protection technology series

AUTHOR: Cochran, R. A., Fraser, J. P., Hemphill, D. P., Oxenham, J. P., Scott, P. R.

C2885H1 FLD: 13B, 68D USGRDR7413

Oct 73 204p

CONTRACT: EPA-68-01-0067

PROJECT: EPA-15080-HES

MONITOR: W74-07341

Prepared in cooperation with Shell Development Co., Houston, Tex. Pipeline Research and Development Lab.

Paper copy available from GPO \$2.35 as stock no. EP1.23;670/2-73-084.

**ABSTRACT:** A system has been developed for recovering spilled oil from water surfaces under a wide variety of environmental conditions and for all types of oils. The system is designed to recover oil at rates up to 9,000 gal./hr. The system is based on the use of polyurethane foam, foamed on the job site, as a sorbent for the spilled oil. The foam is recirculated to increase efficiency and to lower unit costs. Equipment needed includes collection booms, and open-mesh chain-link belt for harvesting the oil-soaked sorbent, and a roller-wringer to remove oil and water from the foam. The foam is initially comminuted and distributed onto the water by means of a hay blower (mulcher), and recycled foam is distributed by an open-throat centrifugal blower. Recovered oil and water are transported to shore in large fabric bags for further treatment prior to disposal. Used foam is disposed of by incineration.

**DESCRIPTORS:** \*Oil pollution removal, \*Water pollution control, Oil spills, Recovery, Polyurethane resins, Foam rubber, Sorbents, Booms(Equipment), Design, Belts(Conveyors), Blowers, Cost engineering, Incinerators, Performance evaluation, Experimental data

**IDENTIFIERS:** EPAORM

PB-231 838/4 NTIS Prices: PC-GPO/MF\$1.45-NTIS

News of Environmental Research in Cincinnati, May-December 1973

National Environmental Research Center, Cincinnati, Ohio. (390 650)

C2811E4 FLD: 13B, 68 USGRDR7412

Apr 74 62p

REPT NO: EPA-670/9-74-002

MONITOR: 18

ABSTRACT: A series of reports are included on the following subjects: Consumerism and solid wastes; constraints to spreading sewage sludge on cropland; CAM-1: using enzymes to detect insecticides; plastics and incineration; using porous pavement to control runoff; relating socio-economic variables to technology for environmental management; oil identification: state of the art; the EPA-DC pilot plant for water pollution control; monitoring radionuclides in reactor effluents; using reclaimed rubber tires in road dressings; conserving water at home; removing organic matter from drinking water; and catalytic converters used in health effects studies.

DESCRIPTORS: \*Environments, \*Pollution, \*Research projects, Solid waste disposal, Sludge, Enzymes, Insecticides, Incinerators, Plastics, Surface water runoff, Pavements, Oils, Radioactive contaminants, Elastomers, Tires, Water conservation, Water treatment, Catalytic converters

IDENTIFIERS: Water pollution control, EPAN

PB-230 935/9 NTIS Prices: PC\$6.25/MF\$1.45

# An Infrared Spectral Sensor for Refuse Sorting

Middlebury Coll., Vt. Dept. of Physics.

Final rept.

AUTHOR: Winkler, P. Frank

C2635I2 FLD: 13B, 14B, 68C, 91A USGRDR7410

Apr 74 81p

GRANT: EPA-R-801342

MONITOR: EPA-670/2-74-031

ABSTRACT: A sensor has been developed for the automatic identification of several categories of materials found in municipal solid waste. The principle of the sensor is to identify materials on the basis of reflected infrared radiation of specific wavelengths. Materials which can be identified with near 100% reliability include cellulose products (primarily paper), plastics, metals, and (with less reliability) glass. More detailed classification is possible in some circumstances. The sensor has been incorporated into an automated refuse separation pilot plant developed at MIT. Results of a related study of the physical characteristics of actual municipal refuse are also reported. (Modified author abstract)

DESCRIPTORS: \*Solid waste disposal, \*Refuse, \*Separation, Infrared detectors, Papers, Plastics, Metals, Glass, Management planning, Design, Pilot plants, Reclamation

IDENTIFIERS: Sorting, EPAN

PB-229 901/4 NTIS Prices: PC\$7.25/MF\$1.45



# System Energy and Recycling: A Study of the Beverage Industry

Illinois Univ., Urbana. Center for Advanced Computation. (407 227)

AUTHOR: Hannon, Bruce

C2624B3 FLD: 13B, 68C, 97G USGRDR7410

17 Mar 73 31p

REPT NO: CAC-23

MONITOR: NSF-RA/N-73-030

Revision of report dated 5 Jan 72.

ABSTRACT: An energy analysis has been performed on the soft drink, beer and milk container systems. The study shows that the energy required to deliver a unit of beverage to the consumer is about three times more in throwaway glass containers than in returnable bottles or bimetallic cans. The energy cost of recycling glass (collecting, separating and remelting) is greater than the comparable cost of mining materials for new bottles. All aluminum cans are about 38% more energy intensive than bimetallic cans. The retail dollar purchase is about 30 percent more for soft drink throwaways, and slightly higher if litter and solid waste disposal costs are added. To complete this study it was necessary to examine the metal, paper, glass and plastics industries in considerable detail. (Modified author abstract)

DESCRIPTORS: \*Solid waste disposal, \*Containers, \*Reclamation, \*Energy consumption, Cans, Bottles, Glass, Metals, plastics, Economics, Aluminum, Collection, Hauling

IDENTIFIERS: \*Beverage containers, Waste recycling, NSFRA

PB-229 183/9 NTIS Prices: PC\$4.75/MF\$1.45

Bureau of Mines Research Programs on Recycling and Disposal of  
Mineral-, Metal-, and Energy-Based Wastes

Bureau of Mines, Washington, D.C. (068 450)

Information circular

AUTHOR: Kenahan, C. B., Kaplan, R. S., Dunham, J. T., Linnehan, D. G.  
C2464K3 FLD: 8I, 13B, 48A\*, 68C\* USGRDR7408

1973 60p\*

REPT NO: BuMines-IC-8595

MONITOR: 18

Supersedes PB-205 663.

ABSTRACT: A summary of Bureau of Mines research on utilization and disposal of solid wastes is presented, accompanied by an extensive bibliography of related publications. The Bureau's Solid Waste and Materials Recycling Program is directed toward four main areas of research, development, and demonstration: (1) extraction of mineral, metal, and energy values from urban refuse; (2) upgrading and recycling of automotive and related ferrous and nonferrous scrap; (3) utilization and stabilization of mine, mill, and smelter wastes; and (4) recover and reuse of values from industrial waste products.  
(Author)

DESCRIPTORS: \*Materials recovery, \*Solid waste disposal, \*Mining, \*Metal industry, Reclamation, Bibliographies, Metal scrap, Fuels, Glass, Refuse, Metals, Residues, Plastics, Incinerators, Iron, Copper, Steelmaking, Rocks, Tailings, Uranium, Vegetation, Phosphates, Soil stabilization, Oil shale, Coal mining, Coal, Industrial wastes, Sulfur, Sulfur dioxide, Flue gases, Railroad cars, Slags, Aluminum, Smelting, Lubricants

IDENTIFIERS: Junk car disposal, BM

PB-227 476/9 NTIS Prices: PC\$3.75/MF\$1.45

Pollution Abatement Disposability Ratings of Packaging Materials Used  
Aboard United States Naval Ships. Volume I

Naval Ship Research and Development Center Annapolis Md . (387691)

Research and Development rept.

AUTHOR: Achilles, Harold E.

C2443B1 FLD: 13B, 15E, 68C, 74E USGRDR7408

Jan 74 33p

REPT NO: NSRDC-28-917-Vol-1, NSRDC-4196-Vol-1

MONITOR: 18

See also AD-774 068.

ABSTRACT: Packaging and packaging materials associated with supply items are a major component of shipboard solid wastes. A program to maximize their disposability has been undertaken. Criteria for rating shipboard disposability characteristics of packaging materials constrained by shipboard process capabilities to handle the materials have been developed. 'Fact' sheets have been compiled, establishing disposability ratings for individual categories of packaging materials. The first edition of the catalog of fact sheets is intended for distribution to cognizant personnel for comments and suggestions which can be used as guidance for preparing an updated document. (Modified author abstract)

DESCRIPTORS: \*Packing materials, \*Solid wastes, \*Disposable equipment, Disposal, Ships, Compacting, Incinerators, Water pollution, Paper, Metals, Wood, Plastics, Fabrics, Rubber, Garbage

IDENTIFIERS: Packaging materials, Disposable containers, N

AD-774 475/8 NTIS Prices: PC\$3.25/MF\$1.45

Pollution Abatement Disposability Ratings of packaging Materials Used  
Aboard United States Naval Ships. Volume II

Naval Ship Research and Development Center Annapolis Md (387691)

Research and Development rept.

AUTHOR: Achilles, Harold E.

C2424H4 FLD: 13B, 15E, 68C, 74E USGRDR7408

Jan 74 119p

REPT NO: NSRDC-28-917-Vol-2, NSRDC-4196-Vol-2

MONITOR: 18

See also AD-774 475.

ABSTRACT: Volume 2 contains the fact sheets concerning the title  
problem.

DESCRIPTORS: \*Packing materials, \*Solid wastes, \*Disposable equipment,  
\*Catalogs, Disposal, Ships, Paper, Metals, Wood, Plastics, Ratings,  
Fabrics, Rubber, Garbage, Tables(Data)

IDENTIFIERS: Packaging materials, Disposable containers, N

AD-774 068/1 NTIS Prices: PC\$4.50/MF\$1.45

Process for Removing Thermoplastic Film from a Mixture of  
Thermoplastic Film and Wastepaper

Department of Agriculture, Washington, D.C. (108 800)

Patent Application

AUTHOR: Laundrie, James F.

C2385D4 FLD: 13B, 68C, 91A, 90 USGRDR7407

13 Sep 72 14p

REPT NO: PAT-APPL-288 761

MONITOR: 18

Government owned invention available for licensing. Copy of  
application available NTIS.

ABSTRACT: The patent describes a process of transporting, in  
suspension, a mixture of wastepaper and thermoplastic film in a hot  
gas stream causing the thermoplastic film to contract upon itself and  
form particles, thereby decreasing its specific surface to such an  
extent as to allow removal of the contracted plastic particles from  
the mixture by standard mechanical methods, such as air classification  
or screening. The process effectively removes all thermoplastic film  
from the wastepaper thus allowing for more efficient paper utilization  
through higher recycling rates.

DESCRIPTORS: \*Patent applications, \*photographic film, \*Waste papers,  
\*Materials recovery, Thermoplastic resins, Shredding, Dehydrators,  
Polyethylene, Solid waste disposal

IDENTIFIERS: PAT-CL-209-11, Recycled paper, GPAG

PB-227 004/9 NTIS Prices: PC\$4.00/MF\$1.45

Ecological Disposal of Plastics, with Emphasis on Foam-in-Place Polyurethane Foam

Plastics Technical Evaluation Center Dover N J (284800)

AUTHOR: Landrock, Arthur H.

C212413 FLD: 13B, 11I, 68C\*, 710\* USGRDR7404

Aug 73 93p\*

REPT NO: PLASTECH-R37A

PROJECT: DA-1-J-662713-D-552

MONITOR: 18

Available to non-U.S. addresses PC\$12.50, MF\$12.50. See also report AD-688 132.

ABSTRACT: The report is an attempt to discuss in depth the factors that must be considered in the disposal of polyurethane foam used in foam-in-place packaging. A total of 166 references are cited in a detailed annotated bibliography. Most of these references cover the broad subject area of ecological disposal of plastics, or closely related subjects, such as thermal degradation characteristics. Few of these references actually consider polyurethane foams. Areas treated include: reuse, recycling, reconversion, open dumping, open burning, sanitary landfill, compacting, incineration, pyrolysis, composting, biodegradation, burning characteristics, thermal degradation, and toxic gas formation. Of the 166 references cited, 19 are further treated in detail in a discussion section, often with considerable data.

DESCRIPTORS: \*plastics, \*foams, \*Polyurethane resins, \*Solid waste, \*Waste management, Thermal degradation, Conversion, Combustion, Earth fills, Compacting, Incinerators, Pyrolysis, Biodeterioration, Gases, Toxicity, Reviews

IDENTIFIERS: Recycling, Reuse, Open dumps, Composting, Polyurethane foams, SPTEC

AD-771 342/3 NTIS Prices: PC\$10.00/MF\$10.00

## Improved Utilization of Construction Materials

Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.  
(220 010)

Research rept.

AUTHOR: Jones, George Vernon

C1822B1 FLD: 13C, 50C\*, 68C, 60C USGRDR7323

Jun 73 257p\*

REPT NO: R73-34, Structures Pub-370

GRANT: NSF-GK-25510

MONITOR: NSF-GK-25510X-12

ABSTRACT: Supplies of natural resources are becoming increasingly scarce as demands increase exponentially. The construction sector is a large consumer of many material resources, and adequate supplies of these materials at the lowest possible price are necessary if the facilities demanded by society are to be provided. The demand for virgin resources can be greatly reduced through recycling. The volume of construction and demolition wastes is estimated to be 4.65 pounds per person per day, which is much larger than previous estimates. To date, these wastes have received very little attention, and as a result only a small amount of the material is recycled. Another way to reduce demand for material resources in construction is to increase facility lifetimes or reuse components or entire structures. The present trend toward off-site fabrication is increasing the feasibility of doing this.

DESCRIPTORS: (\*Construction materials, \*Demand(Economics)), (\*Supply(Economics), Construction materials), Iron, Steel, Aggregates, Aluminum, Cements, Concretes, Plastics, Copper, Demolition, Salvage, Bricks, Design, Forecasting, Solid waste disposal, Utilization

IDENTIFIERS: Waste recycling, NSF

PB-224 244/4 NTIS Prices: PC\$6.25/MF\$1.45

Compendium of University Forums of the National Commission on Materials Policy, May-June, 1972. A Background Document. Proceedings of the Georgia Tech. Forum for the NCMP. Topics--Materials Deteriorating, Construction Materials, Textiles, and Forestry and Forest Products, October 1972

National Commission on Materials Policy, Washington, D.C.

AUTHOR: Agnew, Allen F.

C1731F3 FLD: 5C, 48B, 96A USGRDR7322

Aug 73 171p

REPT NO: NCMP-UF-8

MONITOR: 18

ABSTRACT: The Georgia Tech. Forum examined the four general topics given in the title by specific consideration of deterioration of synthetic plastics and recycling, transportation and construction materials, nonmetallic minerals of construction, textiles in the USA in the 1980's, forest management and land-use conflicts, use of forest residue, and world import functions for the paper industries.

DESCRIPTORS: (\*Natural resources, Meetings), (\*Government policies, Natural resources), Deterioration, Plastics, Materials recovery, Transportation, Construction, Textiles, Wood products, Paper industry, International trade, Land use

IDENTIFIERS: NCMP

PB-223 680/0 NTIS Prices: PC\$10.75/MF\$1.45



Compendium of University Forums of the National Commission on Materials Policy, May-June 1972. A Background document. NCMP Forum on Technological Innovation in the Production and Utilization of Materials at Pennsylvania State University, on 19-21 June 1972

National Commission on Materials Policy, Washington, D.C.

AUTHOR: Agnew, Allen F.

C1731F2 FLD: 5C, 48B, 96A USGRDR7322

Aug 73 223p

REPT NO: NCMP-UF-6

MONITOR: 18

ABSTRACT: The Pennsylvania State University Forum discussed, under the general thrust of technological innovation: iron and steel, nonferrous production metallurgy, economics of substitution, polymeric and ceramic materials, coal and synthetic pipeline gas, and the state of the U. S. mineral position.

DESCRIPTORS: (\*Natural resources, Meetings), (\*Government policies, Natural resources), Iron and steel industry, Metallurgy, Coal gasification, Polymers, Ceramics, Electric power generation, Economics, Substitutes

IDENTIFIERS: NCMP

PB-223 679/2 NTIS Prices: PC\$13.25/MF\$1.45

# Incineration of Plastics Found in Municipal Wastes

Syracuse Univ. Research Corp., N.Y. (339 750)

Final rept.

AUTHOR: Heimborg, R. W., Colella, A. R., Jones, D., Rausch, J. H.,  
Macrina, M.

C1725L1 FLD: 13B, 68C\*, 68A USGRDR7322

Sep 73 246p\*

GRANT: EP-00304

MONITOR: EPA-670/2-73-087

ABSTRACT: The purpose of this project was to determine the combustion efficiency of plastics when burned in several types of laboratory incinerators. These laboratory units were designed to simulate the primary flame zones of municipal incinerators. The parameters of efficiency considered were: Percent of material consumed, the chemical 'cleanliness' of the gaseous effluent, the rate of production of flyash, and the more obvious environmental effects of the gaseous effluent, flyash, and residue-ash. Several pure resins were burned individually in several laboratory incinerators. Also, several mixtures of plastics and a garbage recipe were burned. Results are presented here from analyses of the effluent along with the effects of each effluent on rats and plants for 1- to 8-hour exposures.

DESCRIPTORS: (\*Plastics, \*Combustion), (\*Solid waste disposal, Plastics), (\*Incinerators, Plastics), Garbage, Fly ash, Air pollution, Combustion products, Polyethylene, Polystyrene, Polyvinyl chloride, Acrylonitrile copolymers, Polypropylene, Polycarbonate resins, Polyurethane resins, Urea formaldehyde resins, Melamines, Toxicology, Rats, Plants (Botany)

IDENTIFIERS: NERC

PB-223 651/1 NTIS Prices: PC\$5.75/MF\$1.45

Study of the Technical and Economic Feasibility of a Hydrogenation Process for Utilization of Waste Rubber

Hydrocarbon Research, Inc., Trenton, N.J. Research and Development Lab.

Final rept.

AUTHOR: Wolk, R. H., Battista, C. A.

C1573F3 FLD: 13B, 7A, 68C\*, 99B USGRDR7320

Aug 73 150p\*

CONTRACT: EPA-68-03-0050

MONITOR: EPA-670/2-73-066

ABSTRACT: The report describes an experimental program which studies waste rubber and waste tire disposal problems. The program served to (1) demonstrate the technical feasibility of hydrogenation processing of waste, ground tire feeds; (2) evaluate the worth of liquid and solid products produced; and (3) develop a preliminary model of a commercial flow sheet. The work demonstrated that ground-up tires can be converted into naphtha, low sulfur fuel oil, and reusable carbon black by reaction in a hydrogenation system at elevated temperature and pressure. Data obtained in catalytic and non-catalytic reaction systems were compared. A preliminary design of a commercial plant that could convert 1,000 tons per day of ground up rubber was prepared and its costs were estimated. (Modified author abstract)

DESCRIPTORS: (\*Solid waste disposal, Elastomers), (\*Elastomers, \*Materials recovery), (\*Tires, Materials recovery), (\*Hydrogenation, Elastomers), Rubber industry, Fuel oil, Carbon black, Naphthas, Economic analysis, Catalysis, Slurries, Anthracene, Flow charts, Industrial plants

IDENTIFIERS: Waste recycling, Low sulfur fuels, NERC

PB-222 694/2 NTIS Prices: PC\$4.50/MF\$1.45

# Combustion Products from the Incineration of Plastics

Michigan Univ., Ann Arbor. School of public Health.

Final rept.

AUTHOR: Boettner, E. A., Ball, G. L., Weise, B.

C1501A3 FLD: 13B, 7C, 68C\*, 68A, 59H USGRDR7319

1973 154p\*

CONTRACT: EP-00386

MONITOR: EPA-670/2-73-049

ABSTRACT: Analysis of the combustion products of plastics was undertaken to provide scientists and engineers with information needed to design incinerators in order to maximize their efficiency while minimizing maintainance and pollution, to identify products of incomplete combustion potentially recoverable for their fuel or crude chemical value; and to identify products of incomplete combustion which would be acutely toxic in an accidental fire. Plastics studied were polyvinyl chloride, polysulfone, polyurethanes, polyimide, Lopac, Barex, phenol formaldehyde, urea formaldehyde, polyethylene, polypropylene, polystyrene, polycarbonate, polyphenylene oxide, polyester, synthetic fabrics (Dacron, Orlon, nylon), and natural products (wood and wool). (Modified author abstract)

DESCRIPTORS: (\*Plastics, \*Combustion products), (\*Air pollution, Combustion products), (\*Incinerators, Air pollution), (\*Solid waste disposal, Plastics), Decomposition reactions, Incinerators, Chemical analysis, Gas chromatography, Infrared spectroscopy, Mass spectrometers, Data, Polyvinyl chloride, Thermogravimetric analysis, Polyurethane resins, Polyimide resins, Urea formaldehyde resins, polyethylene, Polypropylene, Polystyrene, Polycarbonate resins, Polyester resins

IDENTIFIERS: NERC

PB-222 001/0 NTIS Prices: PC\$8.00/MF\$1.45

# Environmental Protection in the Synthetic Rubber Industry

National Industrial Pollution Control Council, Washington, D.C.

Sub-council rept.

C1255C2 FLD: 13B, 68, 86A USGRDR7316

Jun 73 25p

MONITOR: 18

ABSTRACT: Synthetic rubber producers have encountered a number of pollution problems, many of which are specific to the petrochemical industry. The pollutants fall into the categories of materials contaminating water and air as well as the categories of solids, noise, and odors. This report is concerned with: the environmental problems faced by the synthetic rubber producers; the programs developed to deal with these problems; and the interesting or original techniques developed that may be of use to other synthetic producers.

DESCRIPTORS: (\*Synthetic elastomers, \*pollution), (\*Rubber industry, pollution), Solid waste disposal, Air pollution, Water pollution, Noise, Odors, Industrial wastes

IDENTIFIERS: Air pollution control, Water pollution control, SECC

COM-73-50575 NTIS Prices: PC-GPO/MF\$0.95-NTIS

Environmentally Degradable Plastics: A Review

Plastics Technical Evaluation Center Dover N J (284800)

AUTHOR: Titus, Joan B.

C1061B3 FLD: 11I, 710\*, 59H USGRDR7314

Feb 73 22p\*

REPT NO: PLASTEC Note-N24

MONITOR: 18

Presented at the Picatinny Arsenal Technical Seminar Dover, N. J., 23 Feb 73.

ABSTRACT: Reviewed are mechanisms for degrading plastics capable of being of being degraded, companies and universities engaged in the degradation technology, costs, suggested applications, military problems with degradable plastics and the future outlook for degradable materials. (Modified author abstract)

DESCRIPTORS: (\*Plastics, Decomposition), Reviews, Costs, predictions, Photochemistry, Solubility

IDENTIFIERS: \*Biodeterioration, Utilization, Water soluble polymers, Chemical reaction mechanisms, SPTEC

AD-760 718 NTIS Prices: PC\$4.00/MF\$4.00

# Solid Waste Management Practices in a Plastics Production plant

Bureau of Solid Waste Management, Rockville, Md.

AUTHOR: Dehn, William T., Carruth, Dennis E.

C0931G2 FLD: 13B, 68C e7301

1970 39p

REPT NO: BSWM-Open File Rept-To-5.0/0

MONITOR: 18

ABSTRACT: A study of solid waste generation, storage, collection, and disposal was conducted at a plastics production plant during the fall of 1968. A study team observed the normal solid waste management practices within the plant during one week. Additional data and information, unavailable during the field study, were obtained through written request to the company. The solid wastes were categorized as either process waste or nonprocess waste. (Author)

DESCRIPTORS: (\*Waste disposal, \*Plastic industry),

IDENTIFIERS: \*Solid waste disposal, EPAL

PB-216 587 NTIS Prices: PC\$4.00/MF\$0.95

Effective Dry Methods of Separating Thermoplastic Films from Wastepapers

Forest Products Lab Madison Wis (141700)

Forest Service research paper

AUTHOR: Laundrie, J. P., Klunness, J. H.

C0823G2 FLD: 13B, 68C\* USGRDR7312

1973 13p\*

REPT NO: FSRP-FPL-200

MONITOR: 18

Prepared in cooperation with Wisconsin Univ., Madison.

ABSTRACT: The report studies two processes that have been developed to separate thermoplastic films from shredded wastepaper in municipal waste in order to aid in the reclamation and recycling of the paper.

DESCRIPTORS: (\*Wastes(Sanitary engineering), \*Material separation), Thermoplastics, Reclamation, Contraction, Adhesion, Paper, Heating

IDENTIFIERS: \*Waste recycling, Plastic bags, Waste papers, Size screening, \*Paper recycling, \*Solid waste disposal, Classifiers, FPL

AD-759 497 NTIS Prices: PC\$3.00/MF\$0.95



Proceedings: National Conference on Packaging Wastes. (1st), 22-24  
September 1969

California Univ., Davis. (072 100)  
C0575L3 FLD: 13B, 13D, 68C, 69M USGRDR7308

1971 241p

GRANT: PHS-EC-00324

MONITOR: EPA-SW-9RG

Paper copy available from GPO \$2.00 as stock no. 5502-0013.

ABSTRACT: The First National Conference on packaging Wastes was held September 22 through 24, 1969 in San Francisco. The conference was structured to promote meaningful dialogue among top-level officials in the entire packaging and user industries, waste disposal industry, government and universities, and also to attract participation of the public at large--all aimed at generating ideas for and approaches to the solution of packaging waste problems. The conference program focused attention especially on defining and clarifying the many problems related to the accumulation and disposal of packaging wastes. The conference did not result in many specific answers to packaging wastes problems: However it did formulate the proper questions in terms of approach and did identify individuals, industrial organizations, government agencies and universities with the capability of cooperatively developing the means for managing and controlling these packaging wastes. The reports presented at the meeting are given in full.

DESCRIPTORS: (\*Waste disposal, \*Packaging materials), (\*Meetings, Waste disposal), Management planning, Metals, Glass, Plastics, Abatement, Government policies

IDENTIFIERS: \*Solid waste disposal

PB-215 328/6 NTIS Prices: PC-GPO/MF\$0.95-NTIS

Towards a National Materials Policy. Basic Data and Issues

National Commission on Materials Policy, Washington, D.C.

C0575F4 FLD: 11F, 71, 70F USGRpR7308

Apr 72 63p

MONITOR: 18

Paper copy available from GPO \$0.65 as stock no. 5272-0001.

**ABSTRACT:** The purpose of the report is to serve as a working paper for those interested and involved in the activities of the Commission. It provides background information on the Commission's assignment and tasks. It presents statistical data and information that hopefully will provide a common base for the deliberations leading to the formulation of a National Materials Policy. And, it outlines broadly many of the issues that have emerged from studies to date. Topics discussed include the following: Establishment and objectives of the Commission; Interest sectors; The nation's materials needs and supplies; The environment and recycling; Materials issues and problems; Commodity summaries; and, Commodity tables.

**DESCRIPTORS:** (\*Government policies, \*Materials), (\*Commodity management, Government policies), Demand(Economics), Supply(Economics), Iron, Chromium, Cobalt, Niobium, Manganese, Nickel, Tungsten, Vanadium, Aluminum, Beryllium, Copper, Lead, Magnesium, Mercury, Platinum, Tin, Titanium, Zinc; Wood products, Glass, Plastics, Elastomers, Coal, Natural gas, Crude oil, Uranium, Reserves, Materials recovery, Pollution, Statistical data, Waste disposal, Utilization

PB-215 261/9 NTIS Prices: PC-GPO/MF\$0.95-NTIS

# Recovering of Plastics from urban Refuse by Electrodynamic Techniques

Bureau of Mines, College Park, Md. College park Metallurgy Research Center.

Technical progress rept.

AUTHOR: Grubbs, Michael R., Ivey, Kenneth H.

C0413J1 FLD: 13B, 68C, 91A USGRDR7306

Dec 72 10p\*

REPT NO: BuMines-TPR-63

MONITOR: 18

ABSTRACT: One important phase of the research on unburned urban refuse is aimed at producing a paper-free plastic concentrate as well as a plastic-free paper product. The method being investigated uses a high-tension electrodynamic separator. The report presents the progress made in developing this technique to separate plastics from paper. The results of the study have indicated that mixed plastic concentrates analyzing 99.4 percent plastic can be consistently recovered from the light material fraction of shredded refuse, leaving a mixed paper fraction analyzing 99.9 percent paper. Recovery of the plastics exceeds 99 percent.

DESCRIPTORS: (\*Materials recovery, Plastics), (\*Waste disposal, Plastics), (\*Electrostatic separators, \*Plastics), Separation, Waste papers, Performance evaluation, Moisture content

IDENTIFIERS: \*Solid waste disposal, \*plastic recycling, Waste recycling

PB-214 267/7 NTIS Prices: PC\$3.00/MF\$0.95

## Salvage Markets for Materials in Solid Wastes

Midwest Research Inst., Kansas City, Mo. (230 350)

AUTHOR: Darney, Arsen, Franklin, William E.

C0345K3 FLD: 13B, 68C, 96A USGRDR7305

1972 331p

CONTRACT: CPE-69-3

MONITOR: EPA-SW-29c

Paper copy available from GPO \$2.75 as stock no. EP1.17:29C.

ABSTRACT: The document presents the findings of a study to evaluate salvage markets for commodities entering the solid waste stream. Emphasis was placed on paper, ferrous metals, nonferrous metals, glass, textiles, rubber, and plastics, however other materials are also discussed. The overall secondary industry is described along with general costs for recovery. Case studies of salvage operations for 14 areas in the U.S. are also reported.

DESCRIPTORS: (\*Waste disposal, \*Materials recovery), Economic analysis, Utilization, Plastics, Metals, Textiles, Waste papers, Glass, Elastomers, Scrap, Metal scrap, Operating costs, Cost estimates, Metal industry, Glass industry, Paper industry, Plastics industry, Textile industry, Sources, prices, Demand(Economics), Supply(Economics), Consumption

IDENTIFIERS: \*Solid waste disposal, \*Secondary materials industry, \*Waste recycling, Glass recycling, Metal recycling, Paper recycling

PB-214 152/1 NTIS prices: PC-GPO/MF\$0.95-NTIS

## Incentives for Recycling and Reuse of plastics

Little (Arthur D.), Inc., Cambridge, Mass. (208 850)

Final rept.

AUTHOR: Milgrom, Jack

C0343L2 FLD: 13B, 11I, 68C, 710, 91A USGRDR7305

1972 316p\*

CONTRACT: PHS-CPE-R-70-0048

MONITOR: EPA-SW-41c-72

ABSTRACT: There were two aspects to this study: To develop a descriptive model of the plastics cycle; and, To develop complete strategies for promoting the recycling and reuse of plastics. The study is reported in five parts. Part I contains a discussion of the technology of plastics, which provides the basis for understanding the technical problems of recycling. Part II describes the economics of the plastics industry needed to develop and assess the strategies for recycling plastics and discusses the market for both virgin and secondary materials. Part III describes in detail the entire plastics cycle as they are manufactured, starting from petrochemicals until they become a plastic end product in the hands of the consumer. Part IV provides an analysis of the existing state of the art of methods for isolating plastics from the solid waste stream and of applications for the scrap material. In Part V the strategies for promoting the recycling and reuse of plastics are developed and described in detail.

DESCRIPTORS: (\*Plastics, \*Waste disposal), (\*Materials recovery, plastics), Utilization, Plastics industry, Resources, Circulation, Reclamation, Plastics processing, Scrap, Economic analysis, Strategy, Legislation, Government policies, Taxes, Cost analysis, Supply(Economics), Containers

IDENTIFIERS: \*Plastic recycling, \*Waste recycling, \*Solid waste disposal, Secondary materials industry, Polymer additives

PB-214 045/7 NTIS Prices: PC\$9.00/MF\$0.95

# Feasibility Study of The Disposal of Polyethylene Plastic Waste

IIT Research Inst., Chicago, Ill. (175 350)

AUTHOR: Gutfreund, Kurt

C0343I2 FLD: 7C, 13B, 11I, 68C, 59H, 710 USGRDR7305

1971 53p

CONTRACT: PH-86-67-274

MONITOR: PHS-Pub-2110

International Standard Book No. 5502-0036.

Paper copy available from GPO \$0.55 as EP3.2:P76.

**ABSTRACT:** Synthetic plastics as polyethylene do not decompose when disposed of in landfills and can cause air pollution problems if burned. An efficient, safe, and economical method for the disposal of wastes as polyethylene is needed. A feasibility study directed toward these objectives and designed to determine the applicability of selected approaches to the problem of polyethylene disposal has been conducted. Particular attention was given to chemical methods of modifying the polyolefin and the effects of the treatments on the mechanical, thermal, and biological properties of the polymer. One of the methods discussed that has appeared particularly attractive involves the oxidative degradation and concomitant nitration of polyethylene by exposure to red fuming nitric acid, or binary systems including HNO<sub>3</sub>, as a constituent.

**DESCRIPTORS:** (\*Waste disposal, \*polyethylene), (\*Decomposition reactions, \*Olefin resins), Packaging materials, Biodeterioration, Oxidation, Nitric acid, Differential thermal analysis, Infrared spectroscopy, Ultraviolet radiation, Calorimetry, Mechanical properties, Heat of combustion, Ultrasonic radiation, Ozonization, Incinerators

**IDENTIFIERS:** \*Solid waste disposal

PB-214 032/5 NTIS Prices: PC-GPO/MF\$0.95-NTIS

New Chemical Concepts for Utilization of Waste Plastics: An Analytical Investigation

TRW Systems Group, Redondo Beach, Calif. (354 595)

AUTHOR: Banks, M. E., Lusk, W. D., Ottinger, R. S.

C034311 FLD: 7A, 13B, 68C, 91A, 59B USGRDR7305

1971 136p

CONTRACT: PH-86-68-206

MONITOR: EPA-SW-16c

International Standard Book no. 5502-0044.

Paper copy available from GPO \$1.25 as EP3.2:P69/2.

ABSTRACT: The objectives of the research were as follows: To identify waste plastic/coreactant reaction products with potential commercial value; To identify waste plastic/air combustion products that are potential air pollutants; and To conceive of and provide technical and economic evaluations for chemical processes using waste plastics as raw materials. The report presents the approaches, methods, and results of these various phases of the technical-economic analyses performed on waste plastic utilization systems. The general approach and analytical tools employed are presented. The determination of the equilibrium species distributions and reaction path analyses are given. The kinetic analyses and preliminary design and economic analyses are also discussed. The conclusions and recommendations include not only the proposed selection of processes for further application, but also other implications, for air pollution.

DESCRIPTORS: (\*Plastics, \*Waste disposal), (\*Materials recovery, Plastics), Utilization, Thermochemistry, Decomposition, Reaction kinetics, Polystyrene, Polyvinyl chloride, Polyethylene, Computer programs, Air pollution, Combustion products, Pyrolysis, Raw materials

IDENTIFIERS: \*Plastic recycling, \*Waste recycling, \*Solid waste disposal

PB-214 031/7 NTIS Prices: PC-GPO/MF\$0.95-NTIS

Proceedings of the Solid Waste Resources Conference on Design of Consumer Containers for Re-use or Disposal, May 12 and 13, 1971

Battelle Memorial Inst., Columbus, Ohio. Columbus Labs. (401 817)

AUTHOR: Sachsel, George F.

C0343E1 FLD: 13B, 13D, 68C, 69M, 91A USGRDR7305

1972 341p\*

MONITOR: EPA-SW-3p

Paper copy also available from GPO \$1.75 as EP1.17:3p.

ABSTRACT: The report is based on a symposium held May 12 and 13, 1971, in Columbus, Ohio. Each of the four parts of these proceedings, corresponding to the sessions of the symposium, brings together current knowledge and thinking in the disposal and reclamation of consumer containers. The contents include topics on the following disposal areas: Plastics, composites and paper (Incentives for the recycling and reuse of plastics, thermoplastics in waste recycling, Polytrip, the returnable plastic milk bottle system, reclamation of plastic-paper composites, paper industry plans); Glass containers (Design trends in glass containers, re-using scrap glass, techniques for self-disposal, composite bottle design and disposal, separation of glass from municipal refuse); Metallic containers (Ferrous scrap recycling and steel technology, metallurgical aspects of reclaiming container scrap, recovery and utilization of aluminum from solid waste).

DESCRIPTORS: (\*Waste disposal, \*Containers), Meetings, Utilization, Materials recovery, Metal scrap, Plastics, Glass, Waste papers, Composite materials, Separation, Reclamation

IDENTIFIERS: \*Waste recycling, Glass recycling, Metal recycling, Paper recycling, Plastic recycling, \*Solid waste disposal, Disposable containers

PB-214 012/7 NTIS Prices: PC\$3.75/MF\$0.95



# An Investigation of the Biodegradability of Packaging Plastics

Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.

AUTHOR: Potts, James E., Clendinning, Robert A., Ackart, Watson B.

C0205B2 FLD: 13B, 11I, 13D, 68C, 710, 69M USGRDR7303

Aug 72 87p\*

CONTRACT: CPE-70-124

MONITOR: EPA-R2-72-046

**ABSTRACT:** The study investigates the effects of various structural parameters on the biodegradability of plastics. It includes a determination of the effect of molecular weight and polymer end group composition on the biodegradability of polyethylene and polystyrene, and an evaluation of the biodegradability of various block, graft and random copolymers containing polyethylene or polystyrene chain segments. Also included is a study of the biodegradability of organic chemicals used commercially as additives to plastics. The study verifies the popular belief that the current high volume, high molecular weight packaging plastics are not biodegradable at practical rates. The report also establishes that the structural modification of polyethylene and polystyrene by random copolymerization with other monomers will not lead to biodegradability. (Author)

**DESCRIPTORS:** (\*Plastics, \*Biodeterioration), (\*Packaging materials, Biodeterioration), (\*Waste disposal, Plastics), Polyethylene, Polystyrene, Polymeric films, Bags, Molecular structure, Molecular weight, Pyrolysis, Ethylene copolymers, Styrene copolymers, Soil tests, Lactams, Plasticizers, Antioxidants, Absorbers(Materials)

**IDENTIFIERS:** \*Solid waste disposal, Plastic bags, Pyrolysis incineration, Polymer additives

PB-213 488/0 NTIS Prices: PC\$4.85/MF\$0.95

Disposal of Polymer Solid Wastes by Primary Polymer Producers and  
Plastics Fabricators

Stanford Research Inst., Menlo Park, Calif. (332 500)

AUTHOR: Marynowski, Chester W.

C0204D2 FLD: 13B, 68C USGRDR7303

1972 103p\*

CONTRACT: PH-86-68-160

MONITOR: EPA-SW-34C

Paper copy available from GPO \$1.00 as stock no. EP1.17:34C.

ABSTRACT: The report deals exclusively with the industrial, or 'pre-consumer' part of the polymer solid waste problem. It explores the nature and extent of the problem in the United States for that segment of the plastics industry representing the largest product tonnage; namely, the segment dealing in the production and fabrication of the principal thermoplastics. It presents technical and economic information on polymer waste disposal methods in actual use, and evaluates alternative approaches to polymer solid waste disposal.  
(Author)

DESCRIPTORS: (\*Plastics, \*Waste disposal), (\*Industrial waste treatment, Plastics), Reviews, Polyethylene, Polypropylene, Polyvinyl chloride, Polystyrene, Thermoplastics, Inventories, Sources, Chemical industry, Earth fills, Biodeterioration, Oxidation, Incinerators, Combustion, Pyrolysis, Questionnaires, Surveys

IDENTIFIERS: \*Solid waste disposal, \*Plastics industry, Sanitary landfills, Pyrolysis incineration

PB-213 444/3 NTIS Prices: PC-GPO/MF\$0.95-NTIS

# The Use of Bags for Solid Waste Storage and Collection

Stone (Ralph) and Co., Inc., Los Angeles, Calif.

Final rept.

A5495E4 FLD: 13B, 13D, 68C, 91A, 69M USGRDR7224

1972 297p\*

GRANT: G06-EC-00172

MONITOR: EPA-SW-42d-72

Prepared in cooperation with City of Inglewood, Calif.

**ABSTRACT:** The study was conducted to evaluate the suitability of disposable plastic and paper sack materials for use as solid waste containers. Six residential areas in Inglewood, California, were selected; three were to receive bags for test use and the remainder to serve as a control. Bag systems studied included household polyethylene and paper bags on holders, free-standing paper bags and polyethylene can liners as well as large polyethylene commercial bin liners that were distributed to a number of restaurants. Results were obtained by using time and motion studies and this information was reinforced by laboratory testing and by an aggressive questionnaire program. A model of the collection system was then developed and subsequent simulation studies were employed for cost analysis. The project demonstrated that bags are quite satisfactory as solid waste container replacements for cans. The most prominent problems, however, were the difficulties in developing efficient bulk storage and distribution methods of the bags.

**DESCRIPTORS:** (\*Refuse disposal, \*Bags), (\*Garbage disposal, Bags), Collection methods, Bag papers, Polyethylene, Time studies, Comparison, Efficiency, Benefit cost analysis, Questionnaires, Public opinion, Earthfills, Field tests, performance evaluation

**IDENTIFIERS:** \*Solid waste disposal, Paper bags, Plastic bags, Sanitary landfills

PB-212 590 NTIS Prices: PC\$6.75/MF\$0.95

# Advances in Solid Waste Treatment Technology

Grumman Aerospace Corp Bethpage N Y Research Dept (406165)

Research rept.

AUTHOR: Hershaft, Alex

A5275A1 FLD: 13B, 68C, 91H USGRDR7222

Aug 72 79p\*

REPT NO: RE-437J

MONITOR: 18

ABSTRACT: The report presents a critical survey of recent advances in solid waste treatment technology and directs the reader's attention to the definitive sources of information in this area. Specific topics covered include storage, removal, transportation, fragmentation, sorting, bulk reduction, conversion, reclamation, and disposal.  
(Author)

DESCRIPTORS: (\*Sanitary engineering, Solids), Reviews, Storage, Handling, Collecting methods, Transportation, Incinerators, Pyrolysis, Material separation, Garbage, Metals, Plastics, Glass, Wastes(Industrial), Disposal

IDENTIFIERS: \*Solid waste disposal, \*Waste disposal, Pipeline transportation, Heat recovery, Composts, Pyrolysis incineration, Materials recovery, Glass recycling, \*Waste recycling, Metal recycling, Agricultural wastes, Tailings, Mine wastes, Spoil, Classifiers

AD-749 409 NTIS Prices: PC\$3.00/MF\$0.95

# Fluidized-Bed Incineration of Selected Carbonaceous Industrial Wastes

Battelle Columbus Labs., Ohio.

Water pollution control research series.

A4982H2 FLD: 13B, 68C, 68D USGRDR7218

Mar 72 92p

PROJECT: EPA-12120-FYF

MONITOR: EPA-12120-FYF-03/72

Paper copy available from GPO \$1.00 as EPA12120FYF03/72.

**ABSTRACT:** The feasibility of fluidized-bed incineration for selected carbonaceous industrial wastes was evaluated. The two-phase program consisted of an initial phase in which wastes from the paint, plastics, rubber, and textile industries in Ohio were characterized, and a second phase in which various waste samples were obtained, analyzed, and experimentally incinerated in a 10 inch diameter fluidized-bed system. Results indicate that sludges from solvent recovery operations in the paint industry, sludges from primary treatment of process wastes from plastic manufacturing, flotation sludges from primary treatment of synthetic rubber manufacture, and the waste from the viscose process of the textile industry can be incinerated in a fluidized-bed system without the production of noxious or toxic exhaust gases. The program also indicates that incineration of the various wastes significantly reduces their potential impact on stream pollution. (Author)

**DESCRIPTORS:** (\*Industrial waste treatment, \*Incinerators), (\*Sludge disposal, Incinerators), (\*Rubber industry, Industrial waste treatment), (\*Textile industry, Industrial waste treatment), (\*Fluidized bed processors, Incinerators), Paints, Plastics, Elastomers, Design, Air pollution, Combustion products, Cost estimates, Water pollution, Industrial wastes, Carbon, Ohio, Performance evaluation, Waste disposal, Abatement

**IDENTIFIERS:** \*Solid waste disposal, \*Water pollution abatement, \*Paint industry

PB-211 161 NTIS Prices: PC-GPO/MF\$0.95-NTIS

Fly Ash-Rubber Mixtures. Studies on Skid Resistance and Durability

Bureau of Mines, Washington, D.C. (068 450)

Rept. of Investigations

AUTHOR: Capp, John P., Makovsky, Leo

A4352A4 FLD: 13P, 11J, 85D, 85D, 71H USGRDR7212

1972 16p

RPPT NO: BuMines-RI-7619

ABSTRACT: Addition of sintered fly ash/bottom ash mixtures to rubber formations failed to increase the skid resistance of the resulting products. Wear, tensile and hot tear strengths, and resilience of the ash-rubber material, as determined in laboratory tests, were significantly less than that of comparable rubber. The material appeared unsatisfactory for automobile and truck tire manufacture, but might prove suitable as a filler in other rubber goods. Raw fly ash could not be satisfactorily compounded with rubber. (Author)

DESCRIPTORS: (\*Fly ash, Tires), (\*Tires, \*Skid resistance), Mixtures, Particle size, Tensile strength, Wear resistance, Tear strength, Sintering, Automobile tires, Additives, Materials recovery, Abrasion resistance

IDENTIFIERS: Filled elastomers, \*Waste recycling

PB-209 017 NTIS Prices: PC\$3.00/MF\$0.95

Evaluation, Extraction, and Recycling of Certain Solid Waste Components

Great Lakes Research Inst., Erie, Pa.

Final rept.

A4241D3 FLD: 13B, 68C USGRDR7211

1972 126p\*

GRANT: PHS-EC-00292

MONITOR: EPA-SW-35D-72

ABSTRACT: The constituents of municipal solid waste are identified along with relative weight percentages typically found. Recycling priorities are established with respect to realistic criteria. Though the study was performed for Erie, Pennsylvania, concepts may be applied elsewhere. Paper, ferrous metals, aluminum, and rubber tires are listed, in that order, with respect to desirability of extraction. Tin cans, glass, and plastics are listed next under additional criteria. A survey of current technology is presented that briefly discusses unit processes as well as complete systems under development. Many unit processes are found to be an outgrowth from mining practices. A device called the 'Bowerman Classifier' is presented and incorporated into a system with potential to separate preprocessed municipal waste. The device operates on the principle of Stoke's Law applied to a moving fluid. All else being held equal, settling velocity will be proportional to density and thus a separation may be effected. (Author)

DESCRIPTORS: (\*Waste disposal, Materials recovery), (\*Refuse disposal, \*Materials recovery), (\*Classifiers, \*Waste treatment), Waste disposal, Waste papers, Metal scrap, Glass, Ceramics, Aluminum, Tires, Copper, Plastics, Earthfills, Cost estimates, Industrial engineering, Engineering drawings, Design criteria

IDENTIFIERS: \*Waste recycling, \*Solid waste disposal

PE-208 674 NTIS Prices: PC\$5.45/MF\$0.95

# Processing the Plastics from Urban Refuse

Bureau of Mines, Rolla, Mo. Rolla Metallurgy Research Center.

Technical progress rept. no. 50

AUTHOR: Holman, J. L., Stephenson, J. B., Jensen, J. W.

A4144G1 FLD: 13B, 11I, 68C, 710 USGRDR7210

Feb 72 24p\*

Report on Solid Waste Research program.

ABSTRACT: In conjunction with its research program on separation, recovery, and recycling of metal, mineral, and energy-based materials in urban refuse, the U.S. Bureau of Mines is developing means to reuse and recycle plastics discarded in raw municipal waste. Experimental work on plastic waste from a community collection has produced some guidelines for systematic methods of processing, including air classification, cleaning, separation, and use or disposal. Sink-float methods are a practical means of separation into types. Methods for final disposition of the plastic waste include refabrication, thermal decomposition and incineration. (Author)

DESCRIPTORS: (\*Waste disposal, Materials recovery), (\*Plastics, \*Materials recovery), Refuse disposal, Dry classifiers, Cleaning, Separation, Combustion, Incinerators, Urban areas, Pyrolysis, Hydrogen chloride, Fabrication

IDENTIFIERS: \*Solid waste disposal, \*waste recycling

PB-208 014 NTIS Prices: PC\$3.00/MF\$0.95



# Approval of Polyvinyl Chloride Liquor Bottles

Internal Revenue Service, Washington, D.C. Alcohol, Tobacco and Firearms Div.

Draft environmental impact statement.

A3893G2 FLD: 13B, 68 USGRDR7208

14 Feb 72 88p

REPT NO: TREAS-IRS-ATF-EIS-72-1

MONITOR: ELR-1865

ABSTRACT: Approval of the PVC liquor bottle will cause a partial replacement of glass liquor bottles by PVC liquor bottles. Such replacement will be reflected in the volume of PVC in the solid wasteload. The burning characteristics of PVC have been reported as having detrimental effects in solid waste disposal. As reported, when PVC material is incinerated, hydrochloric acid is produced which corrodes incinerator parts and pollutes the atmosphere. On the basis of a review of independent studies on the incineration of PVC and other pertinent information, the environmental impact of the PVC liquor bottle in solid waste disposal has been judged as insignificant. The disposal problems inherent in incinerating PVC will diminish as incinerator technology is advanced.

DESCRIPTORS: (\*Environmental surveys, Polyvinyl chloride), (\*Polyvinyl chloride, Waste disposal), (\*Waste disposal, Environmental surveys), Combustion, Incinerators, Air pollution, Bottles, Plastics, Hydrochloric acid

IDENTIFIERS: \*Environmental impact statements

PB-206 561-D NTIS Prices: PC\$3.00

Bureau of Mines Research Programs on Recycling and Disposal of  
Mineral-, Metal-, and Energy-Based Solid Wastes

Bureau of Mines, Washington, D.C. (068 450)

Information circular.

AUTHOR: Kenaham, Charles B., Flint, Einar P.

A3631D1 FLD: 13B, 68C USGRDR7205

1971 71p\*

REPT NO: BM-IC-8529

See also report dated Mar 70, PB-190 647.

ABSTRACT: A summary of Bureau of Mines research on utilization and disposal of solid wastes is presented, accompanied by an extensive bibliography of related publications. Summarized is research in the following areas: Extraction of mineral, metal, and energy values from urban refuse; Upgrading and recycling of automotive and related ferrous and nonferrous scrap; Utilization and stabilization of mine, mill, and smelter wastes; and Recovery and reuse of values from industrial waste products. A contract and grant program which supplements the in-house research and aids in the training of manpower in management of mineral-, metal-, and energy-based solid wastes is also discussed. (Author)

DESCRIPTORS: (\*Waste disposal, \*Materials recovery), (\*Waste treatment, Materials recovery), Bibliographies, Research projects, Refuse disposal, Incinerators, Glass, Metals, Plastics, Pyrolysis, Mines, Metal scrap, Tailings, Industrial wastes, Stabilization, Oils, Fly ash

IDENTIFIERS: \*Waste recycling, Junked automobiles, Waste gas recovery, \*Solid waste disposal

PB-205 663 NTIS Prices: PC\$4.75/MF\$0.95

The Role of Packaging in Solid Waste Management 1966 to 1976

Midwest Research Inst., Kansas City, Mo. (230 350)

AUTHOR: Darney, Arsen, Franklin, William E.

A3271A3 FLD: 13D, 13B, 68C, 69M USGRDR7201

1969 217p\*

CONTRACT: PH-86-67-114

MONITOR: EPA-SW-5c-69

Library of Congress catalog card no. 76-601197.

Paper copy available from GPO \$2.25 as FS2.2:S04-8-966-76.

ABSTRACT: packaging materials are increasing in quantity much more rapidly than the population, primarily because of the continuing rise in self-service merchandising. Per capita consumption, which was 404 lb in 1958, is expected to be 661 lb in 1976. Until recently, no systematic analysis of the relationship between packaging and solid waste disposal had been undertaken. These interactions are defined, and the differences, with possible solutions, are explored. In the report packaging materials, consumption data from 1959 to 1966, and the outlook from 1966 to 1976 are discussed. Also covered are the areas concerned with disposability, analysis of the collectability, the resistance to disposal and processing, and the salvageability and reuse of packaging materials. Finally the mechanisms are explored to mitigate problems that arise from this type of waste: how research, education, incentive programs, taxes, and regulations can reduce the quantity and reduce the processing difficulties of this disposed material, yet save the natural resources from which packages are made.

DESCRIPTORS: (\*Waste disposal, \*Packaging materials), (\*Management planning, packaging materials), (\*Materials recovery, Packaging materials), Government policies, History, Forecasting, Demographic surveys, Economic analysis, Marketing, Environmental surveys, Taxes, Pollution, Consumption, Growth curves, Collection, Cost estimates, Metals, Glass, Plastics, Textiles, Wood products, Packaging papers, Cans

IDENTIFIERS: \*Solid waste disposal, \*waste recycling

PB-204 405 NTIS Prices: PC-GPO/MF\$0.95-NTIS

Rubber Reuse and Solid Waste Management. Part I. Solid Waste Management in the Fabricated Rubber Products Industry, 1968. Part II. Waste Rubber and its Reuse, 1968

UNIROYAL, Inc., Naugatuck, Conn. UNIROYAL Chemical Div. (405 042)

AUTHOR: Pettigrew, Robert J., Roninger, Frank H.

A3123E4 FLD: 13B, 11J, 68C, 71H USGRDR7123

1971 128p

CONTRACT: PH-86-68-208

MONITOR: EPA-SW-22c-71

Paper copy available from GPO \$1.25 as stock no. 5502.0028.

ABSTRACT: The study defines the solid waste management problem of the fabricated rubber products manufacturing industry for the production year 1968 and examines the reuse potential of the industry's waste, as well as the reuse potential of worn out rubber waste from the consumer, mostly tires and inner tubes. In the manufacture of 10.7 billion pounds of salable rubber products in 1968, it is estimated that 1,058 million pounds of solid wastes had to be disposed of at the fabricating locations and at a disposal cost of about \$9.5 million. In most cases, contractors haul solid waste from the plant site for disposal elsewhere, generally to a landfill. For the entire industry, the weighted average cost for both in-plant collection and offsite disposal approximates \$18 per ton of solid waste. In the rubber industry, retreaders, reclaimers, and tire splitters are reusing and recycling solid waste; however, the trend is downward for recycle or reuse. Other possibilities for reusing rubber product waste are discussed.

DESCRIPTORS: (\*Elastomers, Waste disposal), (\*Rubber industry, \*Waste disposal), (\*Materials recovery, Elastomers), Tires, Tire tubes, Regeneration(Engineering), Economic analysis, Cost estimates, Earthfills, Bibliographies, Consumption rate

IDENTIFIERS: \*Solid waste disposal, \*Waste recycling

PB-203 619 NTIS Price: PC-GPO/MF\$0.95-NTIS

Plastics Seen from an Environmental Point of View

Royal Swedish Academy of Engineering Sciences, Stockholm.

Plaster fraen Miljoesynpunkt

A2971A2 FLD: 13B, 68C STAR0918

1969 15p

REPT NO: Iva-MEDD-160

Lang- in Swedish

DESCRIPTORS: \*Plastics, \*Waste disposal, Combustion products,  
Corrosion, Environment pollution, Environmental engineering,  
Hydrochloric acid

N71-30599 NTIS Prices: PC\$3.00 MF\$0.95

Proceedings of Meeting on Environmental Pollution (2nd) 24-25 March  
1971, Sponsored by American Ordnance Association

Edgewood Arsenal Md (401007)

Special publication

AUTHOR: Love, Solomon

A2935B3 FLD: 13B, 68A, 68C, 68D USGRDR7121

Aug 71 226p

REPT NO: EA-SP-100-102

ABSTRACT: The titles of the reports presented include: The joint role of Department of Defense and industry in protecting the environment; Changes in Federal organization for environmental control - changes flowing from the establishment of the Environmental Protection Agency; The air pollution story in Allegheny County; 'Can the urban environment be managed'; Federal program for air monitoring technology; M34 demilitarization program Task Force EAGLE; Detection and protection aspects of Project EAGLE; Consideration in remote raman spectroscopy; Maryland's state and local air quality control agencies 'routine comprehensive air monitoring system'; Problems in meeting emission standards; The Environmental Protection Agency R and D program for water quality control; Nuclear power and the environment; Edgewood Arsenal's test area ecology program; Solid waste disposal from the state's point of view; Handling and incineration of pesticides, plastics, and hazardous chemicals; Advanced fluid bed incinerator.

DESCRIPTORS: (\*Air pollution, Symposia), (\*Water pollution, Symposia), Department of defense, Monitors, Raman spectroscopy, Maryland, Pennsylvania, Urban areas, Incinerators, Scientific research, Nuclear power plants, Radiological contamination, Ecology, Disposal, Wastes (Sanitary engineering), Plastics, Pesticides

IDENTIFIERS: \*Solid waste disposal, \*Government policies, Air pollution detection, EAGLE project, Allegheny County (Pennsylvania), Hazardous materials, Chemical warfare agent decontamination, Remote sensing

AD-729 929 NTIS Prices: PC\$3.00 MF\$0.95

## Plastics in Solid Waste

National Industrial Pollution Control Council, Washington, D.C.

Sub-council rept.

A2221C2 FLD: 13B, 11I, 68C, 65D, 710, 86A USGRDR7113

Mar 71 24p

Paper copy available from GPO \$0.25/copy as 1/3.IN2/8:2P69.

ABSTRACT: Plastics are being used for a variety of purposes, including packaging, because of their physical characteristics. The volume of plastics produced per year is increasing, and the production process involves thousands of facilities throughout the Nation. Many end uses for plastics are long term such as insulation; consequently, the volume of plastic found in municipal refuse is not equivalent to the production volume. In fact plastics are a relatively minor component of municipal refuse by weight. Because plastics are non-biodegradable (generally speaking) and have high heat contents they may be incinerated with little difficulty in properly equipped incinerators. In future incinerator-power generating plants, plastics may serve as a valuable fuel source.

DESCRIPTORS: (\*Plastics, \*Waste disposal), (\*Packaging, Waste disposal), Research, Containers, Chemical industry, Regeneration(Engineering)

IDENTIFIERS: \*Solid waste disposal, \*Waste recycling

COM-71-50086 NTIS Prices: PC-GPO/MF\$0.95-NTIS

ECONOMIC ASPECTS OF OCEAN ACTIVITIES. VOLUME III. ECONOMIC ASPECTS  
OF SOLID WASTE DISPOSAL AT SEA

Massachusetts Inst. of Tech., Cambridge. (220 000)  
A1165K4 FLD: 13B, 68C, 65B USGRDR7024  
Sep 70 134p\*  
MONITOR: MSC-71-68  
See also Volume 2, PB-195 224.

ABSTRACT: The report concentrates on the economics (in a sense wide enough to include all costs and benefits) associated with the disposal of the solids normally found in the refuse collected by large coastal cities. It compares the market costs of various disposal alternatives and derives, through present value analysis, unit market disposal costs for sanitary land fill via rail haul, incineration on land, dumping of compacted bales at sea, and incineration at sea, pointing out the potential ecological problems inherent in each system, and the relevant available information. (Author)

DESCRIPTORS: (\*Waste disposal, \*Oceans), (\*Refuse disposal, Oceans), (\*Economic analysis, Waste disposal), Benefit cost analysis, Cost estimates, Rural areas, Urban areas, Political parties, Ecology, Water pollution, Incinerators, Earth fills, Rail transportation, Water transportation, Composts, Garbage disposal, Paper, Metals, Glass, Plastics, Automobiles

IDENTIFIERS: \*Solid waste disposal, \*Waste recycling

PB-195 225 NTIS Prices: HC\$3.00 MF\$0.65



NTIS PRICE SCHEDULE  
NORTH AMERICAN CONTINENT

STANDARD PRICED  
DOCUMENTS AND MICROFICHE

Price Code	Page Range	Price
A01	Microfiche	\$ 3.00
A02	001 - 025	4.00
A03	026 - 050	4.50
A04	051 - 075	5.25
A05	076 - 100	6.00
A06	101 - 125	6.50
A07	126 - 150	7.25
A08	151 - 175	8.00
A09	176 - 200	9.00
A10	201 - 225	9.25
A11	226 - 250	9.50
A12	251 - 275	10.75
A13	276 - 300	11.00
A14	301 - 325	11.75
A15	326 - 350	12.00
A16	351 - 375	12.50
A17	376 - 400	13.00
A18	401 - 425	13.25
A19	426 - 450	14.00
A20	451 - 475	14.50
A21	476 - 500	15.00
A22	501 - 525	15.25
A23	526 - 550	15.50
A24	551 - 575	16.25
A25	576 - 600	16.50
A99	601 - up	---*

EXCEPTION PRICED  
DOCUMENTS AND MICROFICHE

Price Code	Price
E01	\$ 3.25
E02	4.75
E03	6.25
E04	7.50
E05	9.00
E06	10.50
E07	12.50
E08	15.00
E09	17.50
E10	20.00
E11	22.50
E12	25.00
E13	28.00
E14	31.00
E15	34.00
E16	37.00
E17	40.00
E18	45.00
E19	50.00
E20	60.00
E99	Contact NTIS for Price Quote
N01	\$ 28.00
N02	50.00

COMPUTER PRODUCTS  
MAGNETIC TAPE

Price Code	Price
T01	\$ 110.00
T02	125.00
T03	175.00
T04	250.00
T05	300.00
T06	350.00
T07	400.00
T08	450.00
T09	500.00
T10	550.00
T11	600.00
T12	650.00
T13	675.00
T14	750.00
T15	800.00
T16	850.00
T17	900.00
T18	950.00
T19	1,000.00
T99	Contact NTIS for Price Quote

\* Add \$2.50 for each additional  
100 page increment from 601  
pages up.



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Technical Information Service**  
5285 Port Royal Road  
Springfield, Virginia 22161

Dear Customer:

After January 1, 1977, NTIS began indicating a simple price code in bibliographic citations instead of a dollar price. The price codes indicated in NTISearches can be converted to dollar amounts using the price list given on the reverse of this page.

You will note the price list is divided into three sections:

Standard Priced Documents and Microfiche  
Exception Priced Documents and Microfiche  
Computer Products (Magnetic Tape)

As an example, if a citation indicates a price code A09 then the document is a standard priced item and will cost \$9.00.

Many citations will not include price codes for quite some time. We would, therefore, like to give you some guidelines to assist in determining the correct price for those citations not including a price code.

- (1) If a paper copy price code is not indicated, find the page count in the citation and look up the corresponding page range in the Standard Price Schedule, then pay the price indicated.
- (2) If the paper copy price printed in the citation is higher than the price indicated in the Standard Price Schedule, then pay the price printed in the citation.
- (3) Most microfiche are available for \$3.00. If the microfiche price printed in the citation is higher than \$3.00, then pay the price printed in the citation.
- (4) For Computer Products (Magnetic Tape) contact NTIS for a price quote.

We hope this price list and guidelines for its use will be helpful during this interim period when both price codes and non-current prices appear in the on-line searches. If you have any questions, do not hesitate to telephone NTIS Customer Sales, (703) 557-4650.